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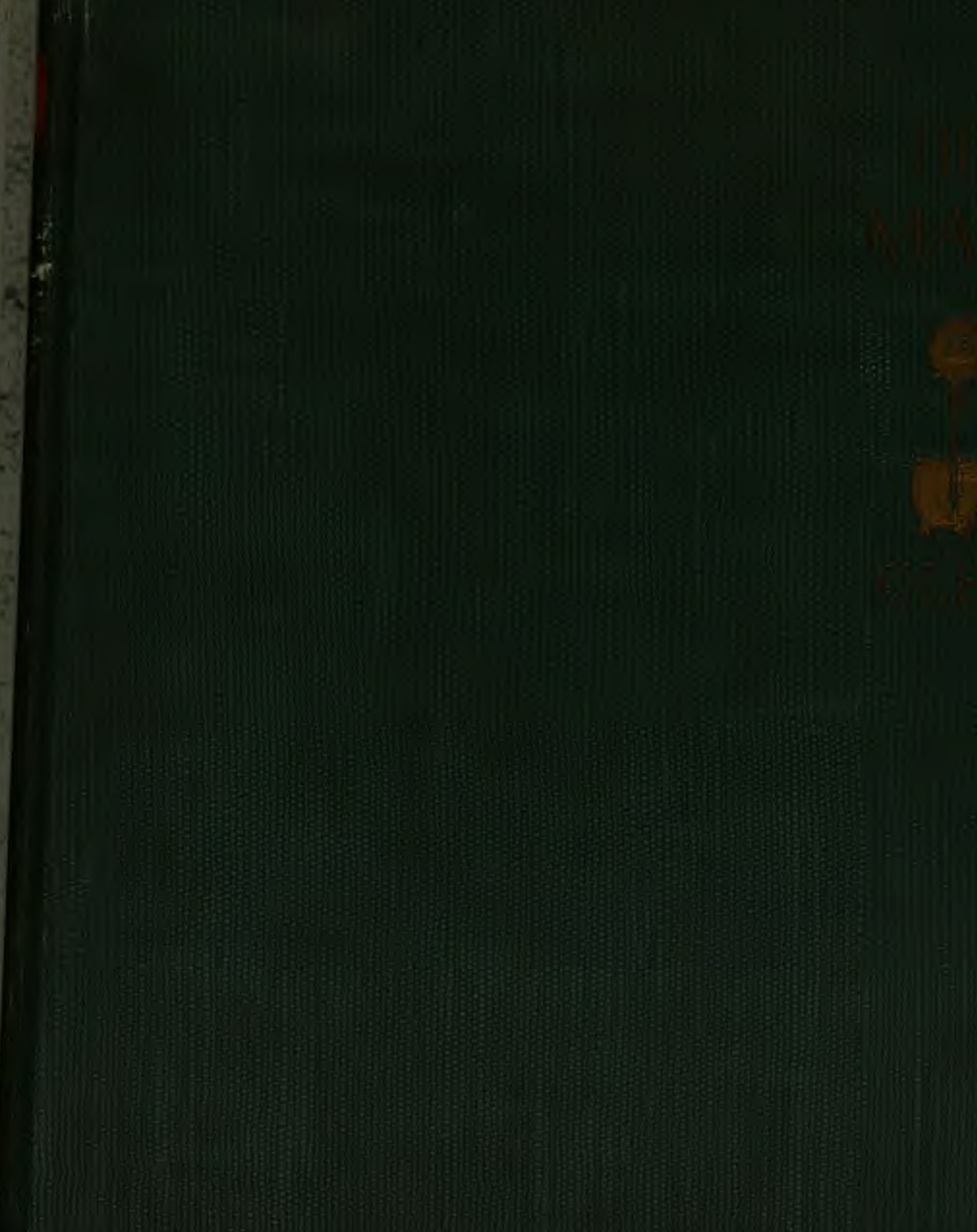
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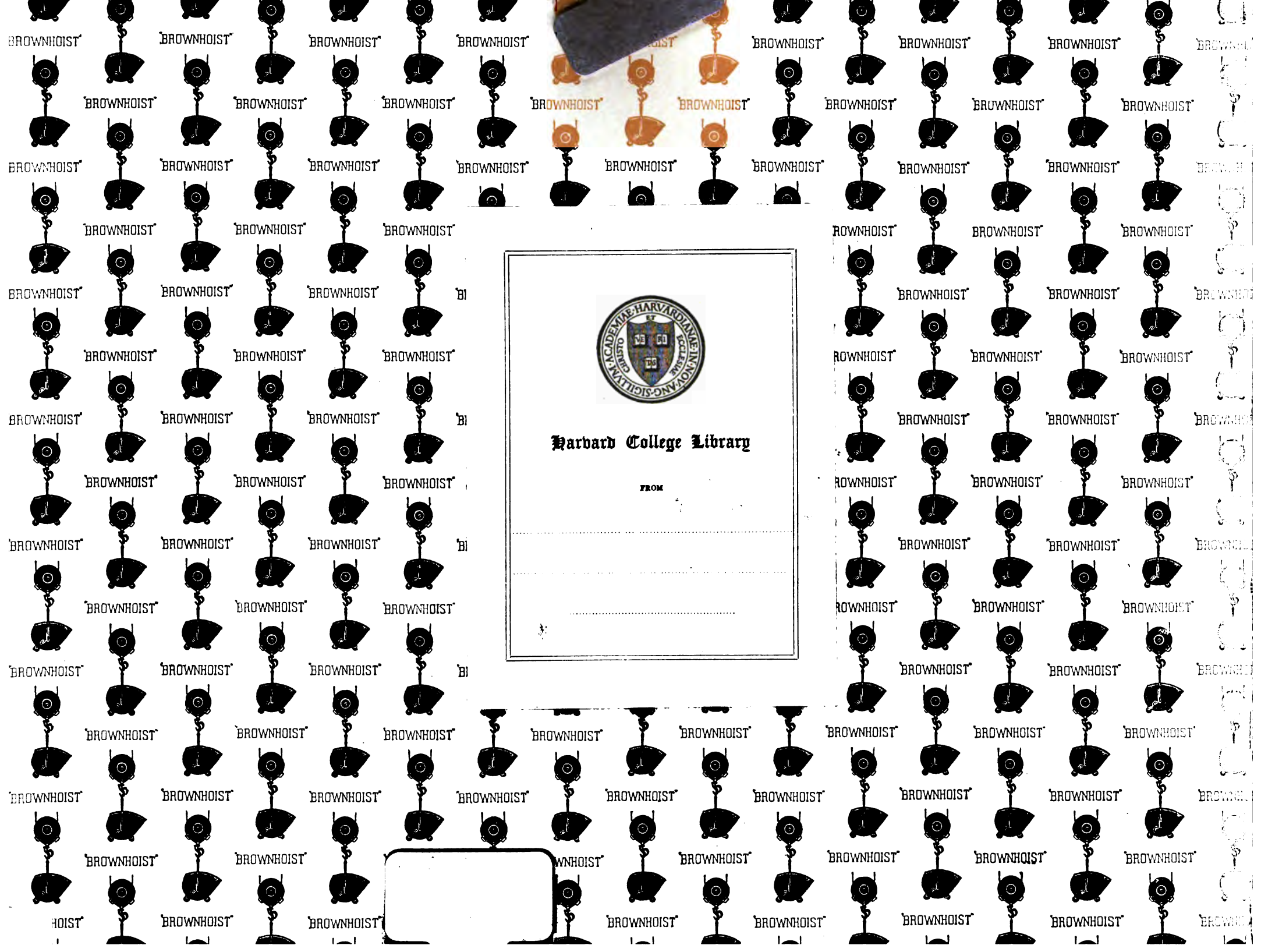
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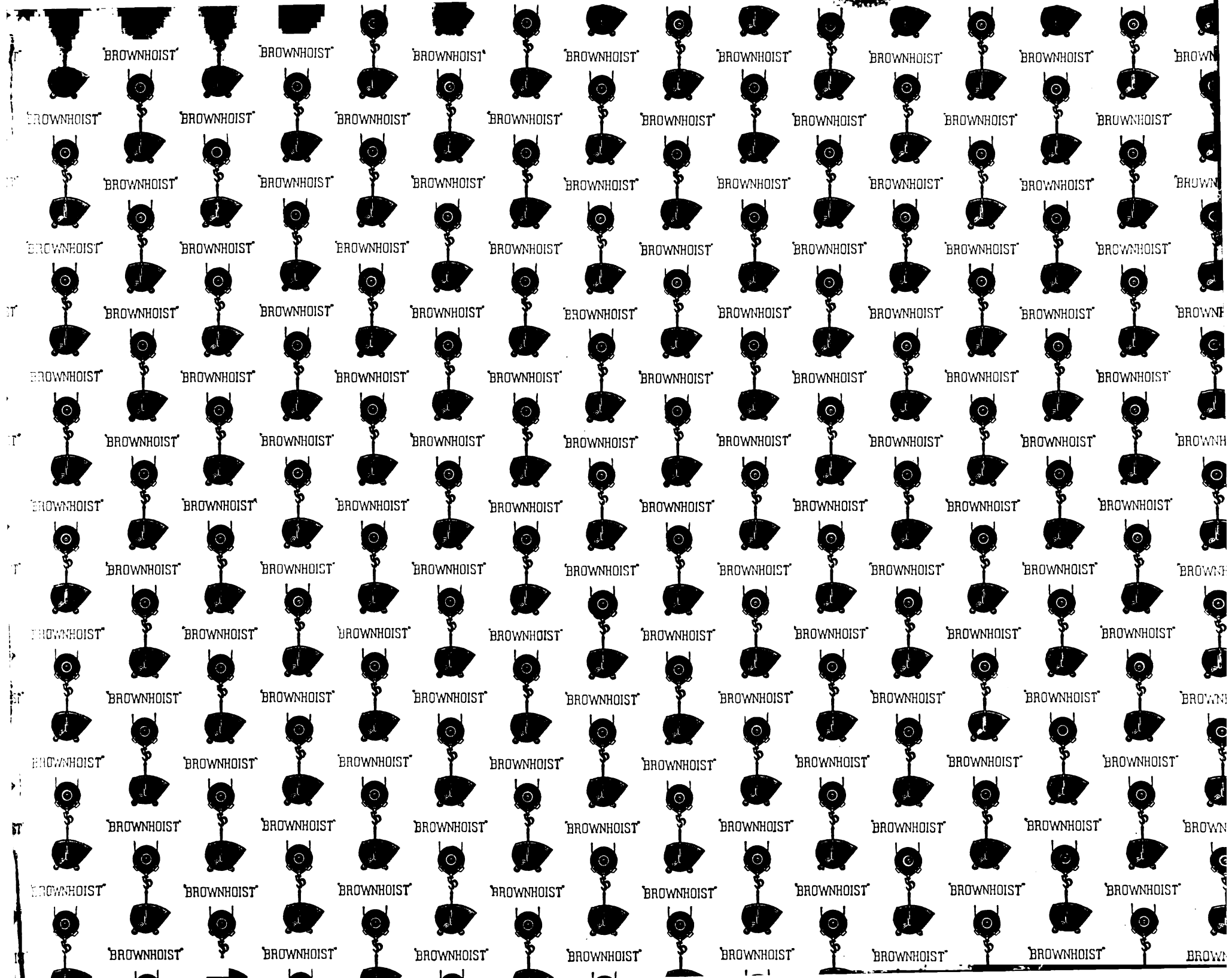
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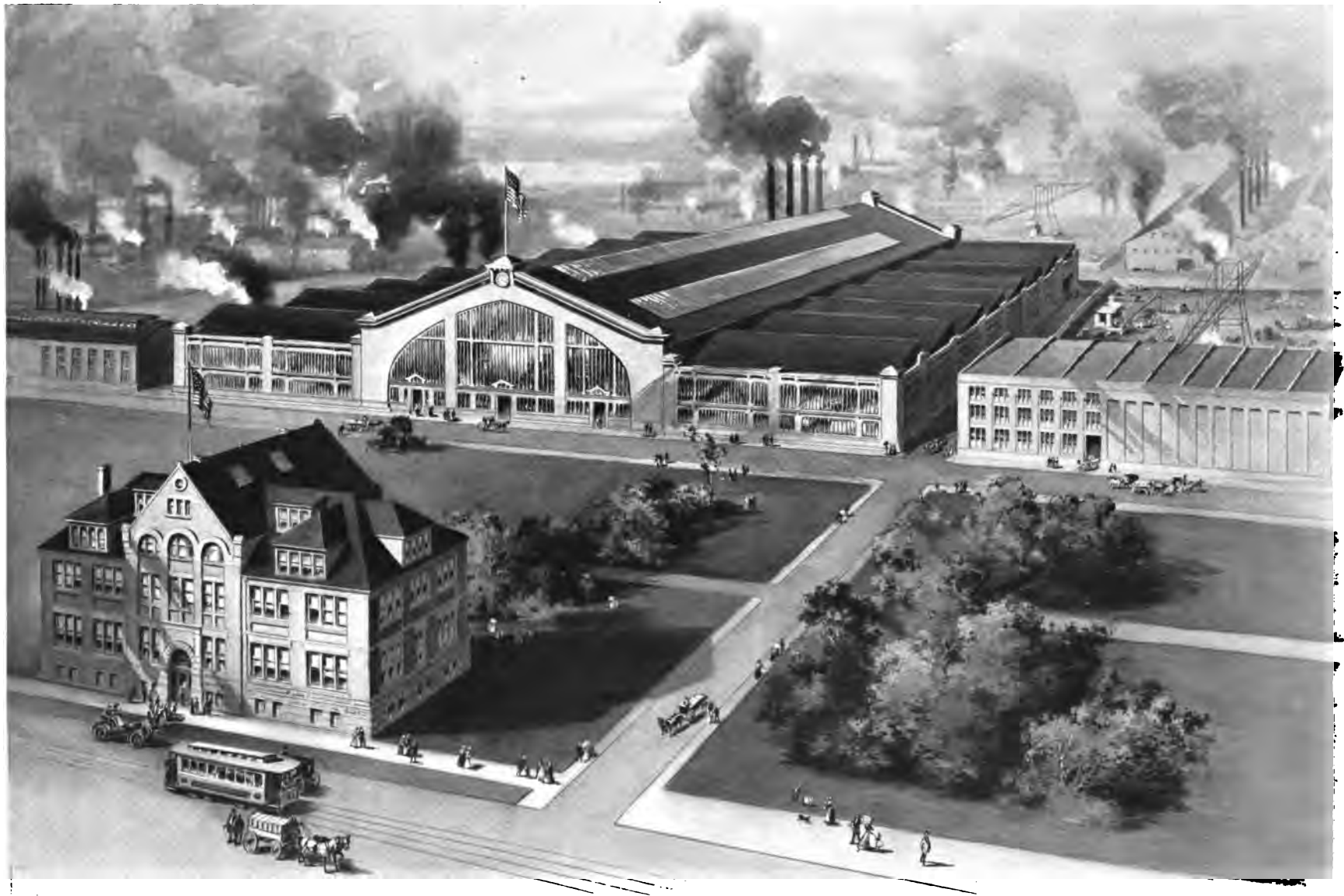








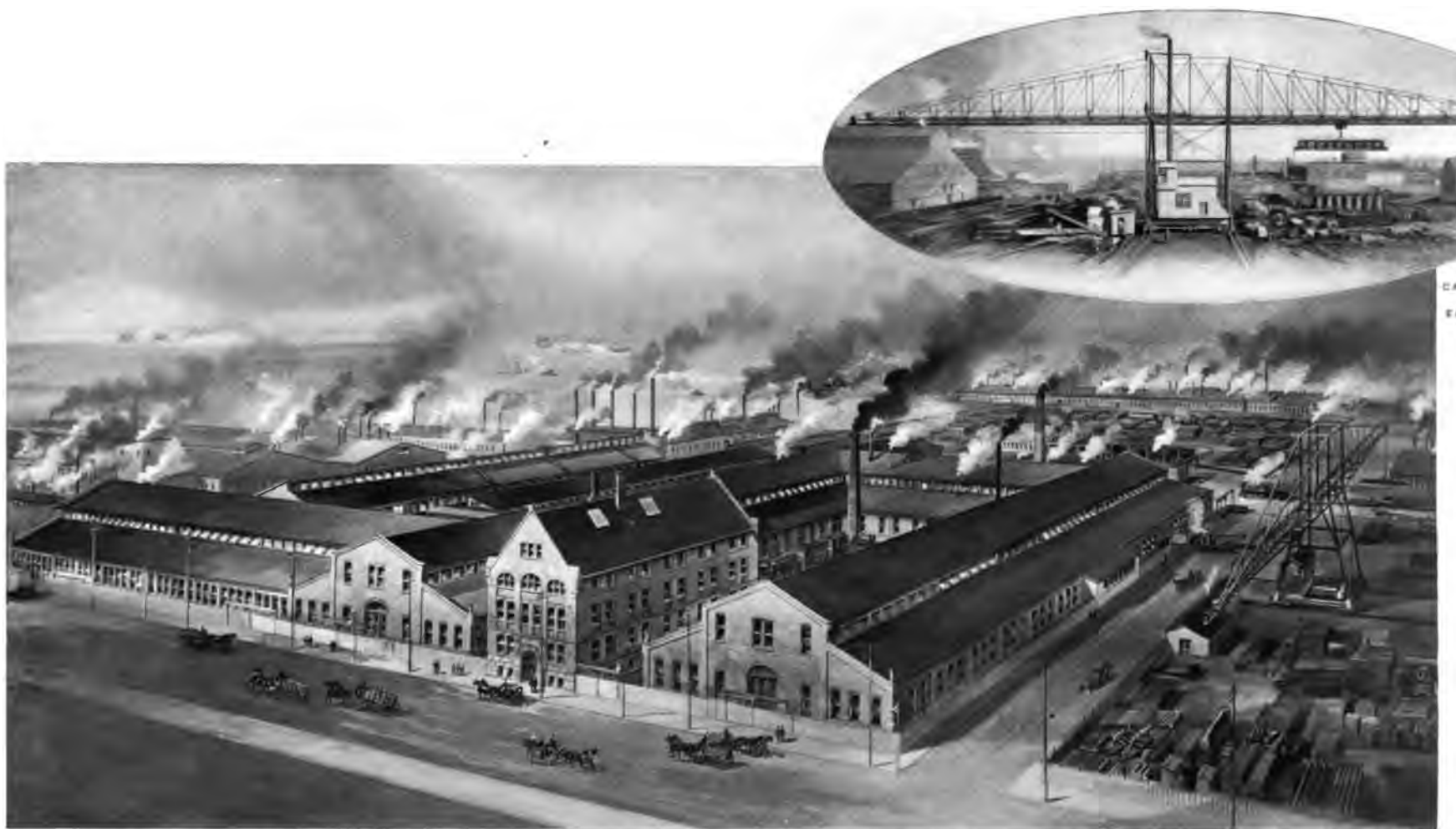




**MAIN WORKS AND OFFICE OF THE BROWN HOISTING MACHINERY COMPANY, CLEVELAND, OHIO, U. S. A.**  
1435 St. Clair Street, on the lines of the Pennsylvania and Lake Shore & Michigan Southern Railroads, from which branch tracks extend into the grounds and buildings.







**OLD WORKS OF THE BROWN HOISTING AND CONVEYING MACHINE COMPANY, CLEVELAND, OHIO, U. S. A.**

Destroyed by fire in 1900. The site of present new works is shown on preceding page.

The Fleming Press  
New York

No. **5530**

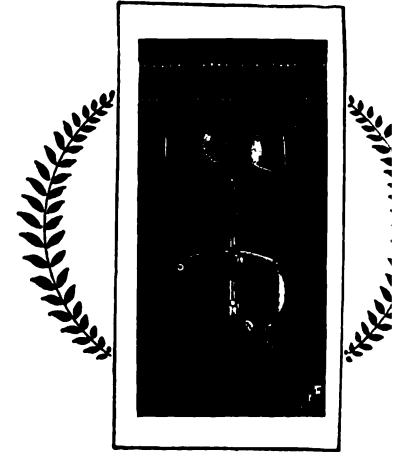
N.Y.O. 8.05.3000 E.

# THE BROWN HOISTING MACHINERY COMPANY

## "BROWNHOIST"

PATENT AUTOMATIC  
HOISTING AND CON-  
VEYING APPLIANCES

MAIN OFFICE AND WORKS.  
CLEVELAND, OHIO, U. S. A.



*NEW YORK OFFICE  
26 CORTLANDT ST.  
NEW YORK, N. Y.*

*PITTSBURG OFFICE.  
FRICK BUILDING  
PITTSBURG, PA.*

*EUROPEAN OFFICE  
39 VICTORIA ST.  
LONDON. S. W. ENGLAN.*

Erg 1749.05 F

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SCHOOL OF ENGINEERING

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THE BROWN HOISTING MACHINERY COMPANY.

# THE BROWN HOISTING MACHINERY COMPANY.

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MAIN OFFICE AND WORKS: CLEVELAND, OHIO, U. S. A.

FOUNDED IN 1880.

CAPITAL FULL PAID — \$2,000,000.

## ERRATUM

Legend on page 147, "The 'BROWNHOIST' Patent Grab-bucket for Handling Coal," should read: "The 'BROWNHOIST' Patent Grab-bucket for Handling Iron Ore."

Legend on page 148, "The 'BROWNHOIST' Coal Grab-bucket for Handling Iron Ore," should read: "The 'BROWNHOIST' Patent Grab-bucket for Handling Coal."

General Manager.

HARVEY H. BROWN, Treasurer.

GEO. C. WING, Secretary and Counsel.

## BRANCH OFFICES.

EASTERN OFFICE: 26 CORTLANDT STREET, NEW YORK, N. Y.

PITTSBURG OFFICE: FRICK BUILDING, PITTSBURG, PA.

EUROPEAN OFFICE: 39 VICTORIA ST., LONDON, S. W., ENGLAND.

## CABLE ADDRESSES.

Main Office and Works, Cleveland, Ohio . . . "BROWNHOIST, Cleveland."

Eastern Office, New York, N. Y. . . . "BROWNHOIST, New York."

European Office, London, England . . . . "BROWNHOIST, London."

## TELEGRAPHIC ADDRESS.

European Office, London, England . . . . "SHOVELLING, London."

## CODES USED.

A. B. C., Lieber's, A1, Engineering Telegraph, and Directory.



**THE OLD METHOD.**  
BEFORE THE DAYS OF THE "BROWNHOIST."



## INTRODUCTION.

**T**HE BROWN HOISTING MACHINERY COMPANY are engineers, designers, and manufacturers of complete plants for the rapid and economical handling of material, using the well-known system invented by Alexander E. Brown, Vice-President and Engineer of the Company, all of whose patents, as well as many others, are now owned or controlled by this Company.

The Brown patents embrace special machinery for the rapid handling of coal and ore, High-speed Gantry and Cantilever Shipbuilding and Yard Cranes, Furnace-hoists, etc.; and the other patents include a full line of Cranes of all kinds, embracing the well-known Yale & Towne patents, purchased several years ago, of which a special Crane Catalog of 260 pages is issued.

This catalog explains the "Brown System" of handling materials, shows some representative plants which we have designed and built, and illustrates the adaptability of the "Brown System" to widely varying conditions of work.

All the apparatus and devices shown or described in this book are duly protected by letters patent in the United States and foreign countries.

Prior to 1900 the corporate name of this Company was The Brown Hoisting and Conveying Machine Company, but in October of that year the Company was reorganized and incorporated as The Brown Hoisting Machinery Company.

Cleveland, Ohio, 1905.

## “BROWNHOIST.”

“BROWNHOIST” IS the familiar name by which our coal- and ore-handling machinery was known along the Great Lakes in America, where these machines were first extensively used.

Twenty-three years ago the first “BROWNHOISTS” were erected at Cleveland, Ohio, by Alexander E. Brown, now Vice-President and Engineer of this Company, and since then over three hundred machines, representing nearly one hundred separate plants, have been erected at various points, and are in daily operation during the season of navigation, handling Lake coal and ore traffic, to about twenty-seven

The “BROWN-world’s record for speed and cargoes, and are daily dis-thousand tons of iron ore same on cars or storing on this machinery has entirely affecting the ore- and coal-Lakes in America, and has steamers now engaged in

freight rates known in the world.\* These results have attracted so much attention everywhere that we are building large plants, not only for other parts of America, but also for almost every country in the world, and the “BROWNHOIST” machinery has become the accepted standard for handling materials.

The “BROWNHOIST” is built in many different forms, to meet various conditions and requirements, but all involve the same general characteristics, as will be shown throughout this catalog.



ONE OF THE EARLY BRIDGE TRAMWAY PLANTS.

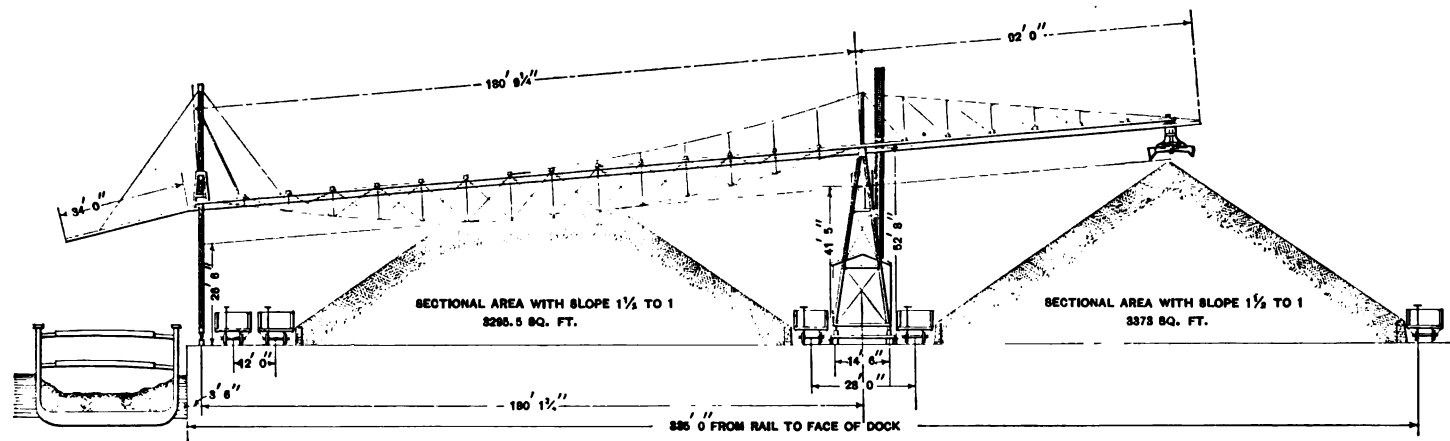
ninety per cent. of the entire which in 1902 amounted million tons. HOISTS” have made the economy in handling such charging cargoes of seven in ten hours and putting dock. The general use of changed the conditions carrying trade on the Great made possible the great this business and the lowest

\* See diagram on page 33.

## BRIDGE TRAMWAY PLANTS.

**DESCRIPTION.** A Bridge Tramway plant (shown below) generally consists of three or four "Standard Bridges," mounted side by side on suitable rails, each machine operating one hatch of a vessel. Two of these bridges are supported at their back ends on a double back pier; the other bridge or bridges are supported singly on single back piers.

**BRIDGE.** The bridge-girders are built of steel and iron, of our patent construction, designed to give the maximum strength with the minimum weight of material, with all the members made of such shapes and so arranged in the



SIDE ELEVATION TO STANDARD BRIDGE TRAMWAY PLANT.

trusses as to offer the least possible surface to wind-pressure. Owing to the exposed locations where these machines are generally used, the question of wind-pressure becomes of the greatest importance.

Our standard constructions are generally of steel and iron; but at times, for special reasons, such details as crossbeams and track-stringers are made of wood.

Two standard sizes of Bridge Tramway are as follows:

180-foot span, with 34-foot apron over vessel, with cantilever extension beyond back pier of 80 or 104 feet.

192-foot span, with 34-foot apron over vessel, with cantilever extension beyond back pier of 80 or 104 feet.



FRONT PIERS, VESSEL READY TO UNLOAD.

**BACK PIERS.** The back piers are built of steel and are mounted on wheels, and move on a track consisting of two lines of rails of suitable gauge, laid on the surface of wharf parallel to front of same. The back piers can be moved independently of the front piers by either hand or power. The double pier, containing the engine-house, is always moved by its own power.

**HINGED APRON OVER VESSEL.** Each machine is provided at its front end with a hinged apron of suitable length for extending the trolley-tracks of the machine over the hatch of a vessel. This apron is hinged so that it can be raised in a vertical position when not in use, thereby keeping the front of the pier or dock entirely free and unobstructed, so that vessels with masts may come alongside. When the vessel is tied to the dock the aprons are lowered and

These Bridge Tramway machines can be furnished without cantilever extensions, or the cantilever extensions can be added at a later time if the bridges are originally made with this in view.

We can build these machines with many special modifications, and with longer or shorter spans, as will be shown in this catalog, but these we class as special machines.

**FRONT PIERS.** Each bridge is supported in front by an independent single pier of "A-frame" construction, built of steel mounted on wheels, and running on a single line of rails; each bridge is connected to the front pier (and back pier) in such a manner as to permit the front end of the bridge to be "skewed" or moved sidewise, to suit the hatches of a vessel without moving the rear end. This front pier is generally arranged to be moved by hand-power by means of cranks geared to the track-wheels; but this is also done by power when desired.



BACK PIERS.

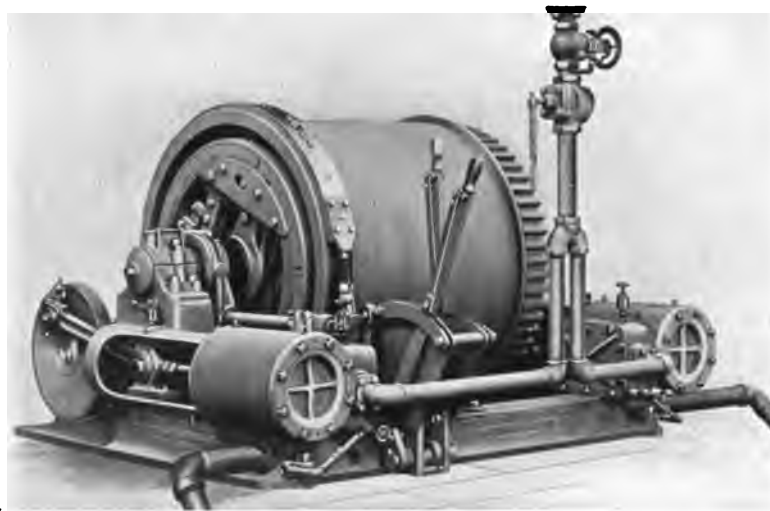


**"BROWNHOIST" STANDARD BRIDGE TRAMWAY PLANT, ASHTABULA, OHIO.**

adjusted to the hatches by moving the front piers. This hinged apron is generally raised by a hand-winch, but can be made to raise by power.

**ENGINES.** A double-cylinder engine (or electric motor), with cylinders and drums of suitable size, is required to operate each bridge. These engines are built especially for the work they are to perform, which is very severe, and they are therefore exceptionally strong and well proportioned. They run in one direction all the time, any change of motion being through a very efficient friction-clutch of our own design and construction, as shown on page 16.

**HOISTING- AND CONVEYING-MACHINE.** This machine, also called the "trolley," runs along a track suspended from the bridge, between the girders, and from the farther end of the hinged apron, over the vessel, back to the rear end of the cantilever extension. This trolley, together with its suspended bottom block, hook, or grab-bucket, is attached to the hoisting- or pulling-line, and its motions are under perfect control of the operator by means of suitable levers in the operator's house.



STEAM-DRIVEN DRUM FOR BRIDGE TRAMWAY PLANT.



ELECTRIC-MOTOR DRIVEN DRUM, FOR BRIDGE TRAMWAY PLANT.

**TUBS OR BUCKETS.** For handling iron ore a special ore grab-bucket is used, which is self-filling and will handle up to about eighty per cent. of a ship's cargo without hand-shoveling. These grab-buckets are made in sizes from 18 to 150 cubic feet capacity.

For shoveling ore or coal from stock-pile to cars or boats, an automatic shovel-bucket is sometimes used (see page 149) requiring no hand-shoveling whatever. Either type of bucket mentioned above is interchangeable on any of our Bridge Tramways which are adapted for such work, and the change from one to the other can be made quickly.



INDICATOR.





HOISTING AND CONVEYING-MACHINE, OR  
TROLLEY.

**BUCKET-HOOK.** The “BROWNHOIST” Safety Bucket-hook shown on this page is used on all our hoisting and conveying machinery where grab-buckets are not used, and is designed especially to allow quick hooking on and unhooking of tubs, buckets, slings, etc., without any possibility of accident to the men handling the hook, and completely preventing it from accidentally becoming unhooked.

**WEIGHING-SCALES.** We frequently provide each bridge with a set of scales, so that every load, as it passes a given point, can be weighed by the operator or other attendant.

**OPERATOR.** All functions of the engine are controlled by the operator, who is placed on a covered platform, usually on top of the double back pier, above the engine-house, from which point he can overlook the dock, and by means of suitable levers control the operation of the entire machine as well as opening and closing

the bucket. One operator and a set of levers are required for each bridge, but all the operators are stationed in the same operators’ house. One fireman, or attendant, for a single plant of three or four bridges is all that is necessary to attend to the engines and boiler or motors.

**OPERATION.** At a given signal (generally a semaphore placed on top of the front pier and operated by rope from the hold of the vessel) the operator throws the proper lever and hoists the bucket at full speed through the hatch of the vessel, after which the trolley carries the bucket to a point along the bridge or cantilever extension where it is desired to dump the load. Dumping is effected at will by simply throwing the proper lever in the operators’ house. When the load is dumped the operator allows the bucket to return to a set point over the vessel’s hatch. The bucket is then lowered into the hold where, by the proper manipulation of levers, the bucket is filled and likewise hoisted again. This operation is the same on each of the three or four machines comprising the plant and is repeated on all of them until the vessel is unloaded. It is also possible for the operator to lower the bucket of ore or coal to cars or docks, and dump same in the car or on the surface of dock or top of pile.

The operator can equally well reverse the above process—*i. e.*, take the loaded bucket from dock or car and convey same to and dump into the hold of the vessel, either dumping from



SAFETY BUCKET-HOOK AND  
BOTTOM BLOCK.



the trolley or lowering to the bottom of the hold; or he can take from any point under the bridge (or cantilever) and deliver to any other point under the bridge (or cantilever).

**CAPACITY.** A plant of three bridges will readily hoist and dump on the dock at an average distance of one hundred and fifty to two hundred feet, eighteen hundred tons of ore per day of ten hours, with a 26-cubic-foot grab, or more than this if larger size grabs are used.

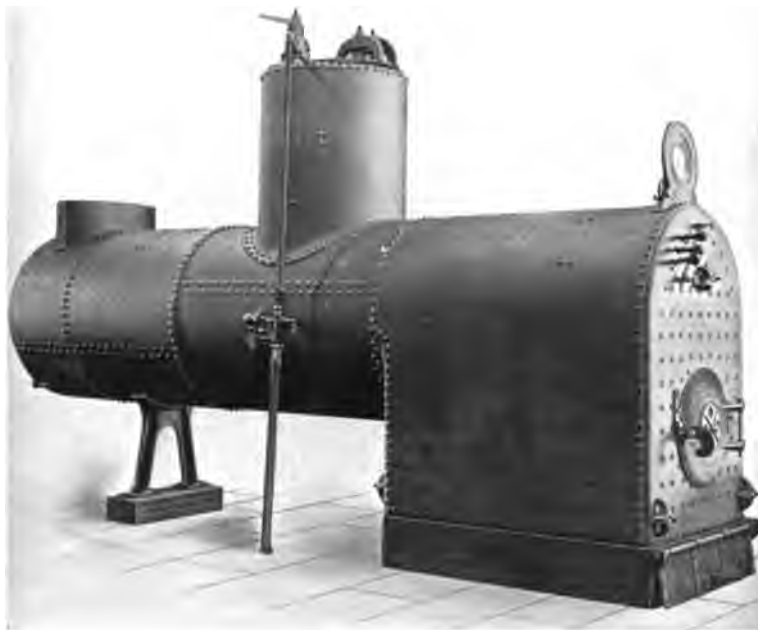
Usually a round trip can be made from the hold of the vessel to the extreme end of the cantilever extension and back again in one minute—a distance of six hundred feet, in addition to the height of hoist. In actual work a rate of forty-five seconds per trip has been averaged for a few hours, but experience has shown that it is generally impossible to maintain such rates of speed in discharging an entire cargo, as “making bottom,” or sinking through to the skin of the vessel, is the longest and hardest part of the work.

#### CHANGES.

These bridge tramway plants can be built with a great variety of changes to meet varying conditions and locations and for an endless variety of work, as will be seen by the pictures throughout this book.



OPERATING-CLUTCH, BAND-FRICTION TYPE.



TYPE OF BOILER GENERALLY USED ON BRIDGE TRAMWAY PLANTS.



SCALES AND SCALE-HOUSE APPLIED TO BRIDGE TRAMWAY.



**PLANT OF THREE "BROWNHOIST" BRIDGE TRAMWAYS.**  
HAVANA COAL COMPANY, Havana, Cuba.



**PLANT OF "BROWNHOIST" STANDARD BRIDGE TRAMWAYS.**  
At Cleveland, Ohio.



**PLANT OF THREE "BROWNHOIST" BRIDGE TRAMWAYS, IN COMBINATION WITH "FAST PLANT" UNLOADERS.**

Coal and Coke Dock of the MILWAUKEE GAS COMPANY, Milwaukee, Wisconsin. The "Fast Plant" unloaders work independently of the bridges.



**PLANT OF FOUR "BROWNHOIST" BRIDGE TRAMWAY MACHINES.**  
COXE BROTHERS & COMPANY, Milwaukee, Wisconsin. 48-cubic-foot coal grab-buckets.



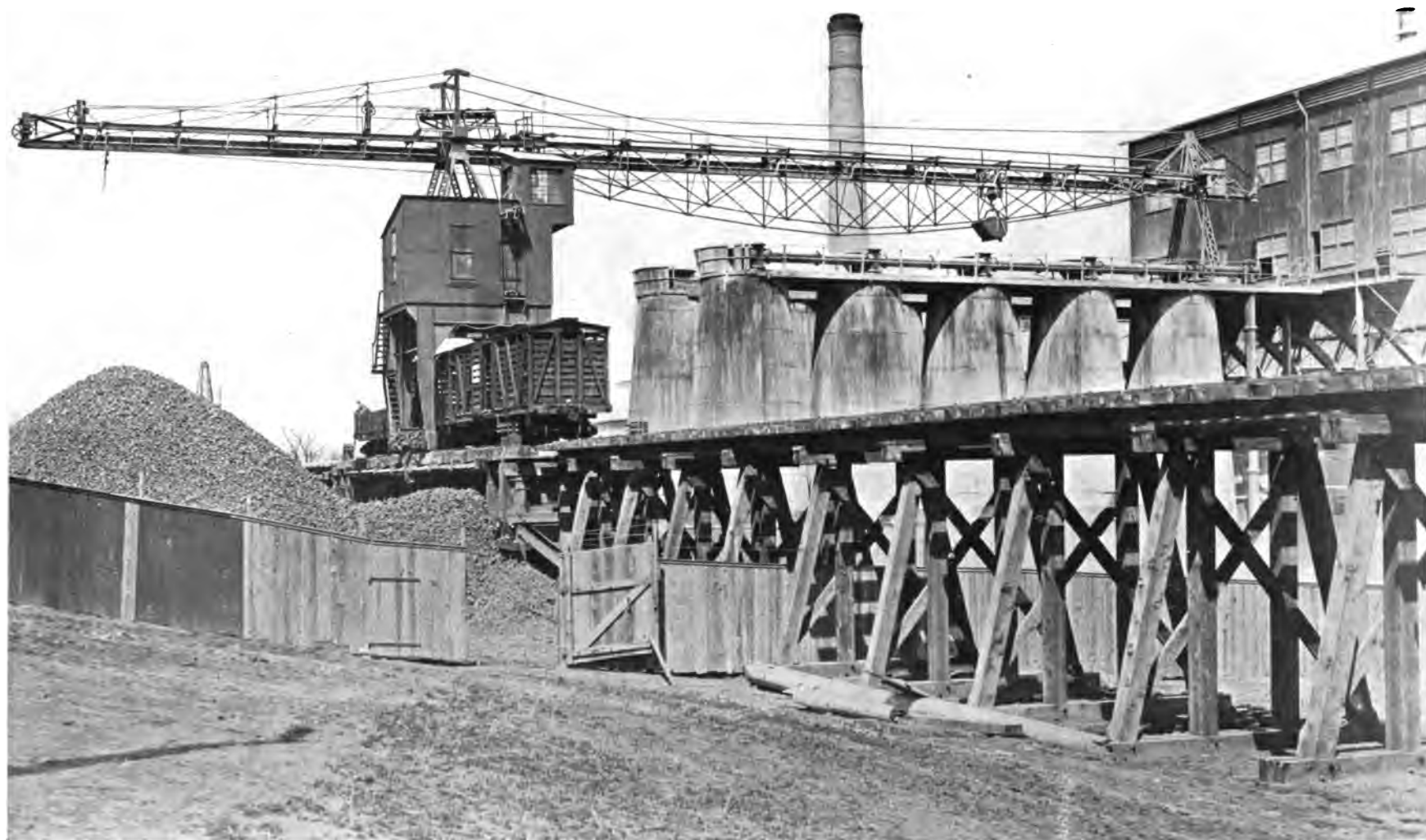
**PLANT OF THREE "BROWNHOIST" BRIDGE TRAMWAYS.**  
EASTERN RAILWAY OF MINNESOTA, West Superior, Wisconsin. 54-cubic-foot coal grab-buckets.





**PLANT OF TWO "BROWNHOIST" BRIDGE TRAMWAY MACHINES**  
GRAHAM BROTHERS, Malmö, Sweden.





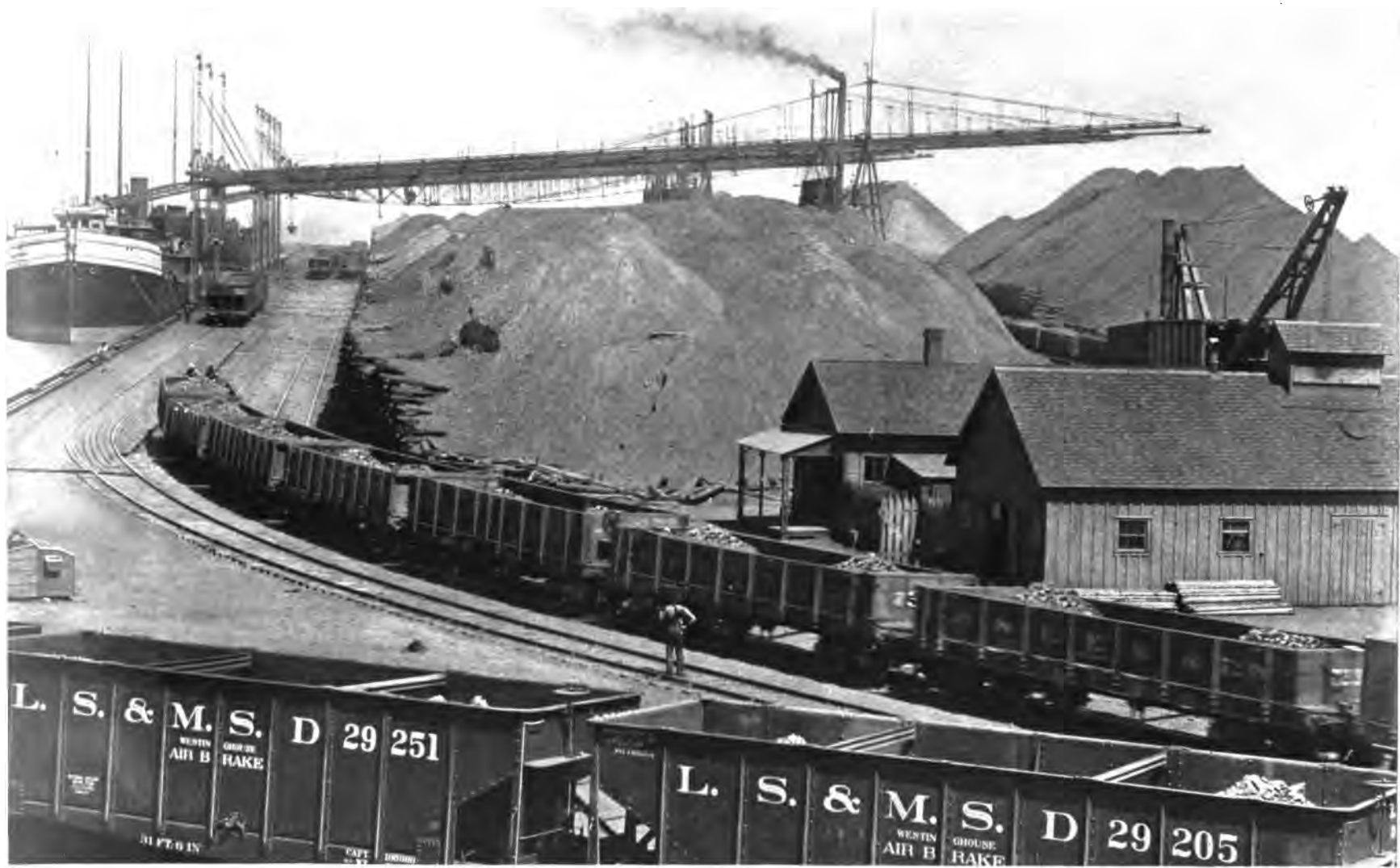
**"BROWNHOIST" BRIDGE TRAMWAY.**  
COLUMBIA CHEMICAL COMPANY, Barberton, Ohio.







**MENOMINEE DOCK OF THE LAKE SHORE & MICHIGAN SOUTHERN RAILWAY**  
Equipped with twenty-four



**CHIGAN SOUTHERN RAILROAD, ASHTABULA, OHIO.**  
Standard Bridge Tramways.









**ORE-DOCKS OF THE ERIE RAILROAD AND OF T**

There are over seventy "BROWNHOIST" machines in the picture, with  
(See also plan



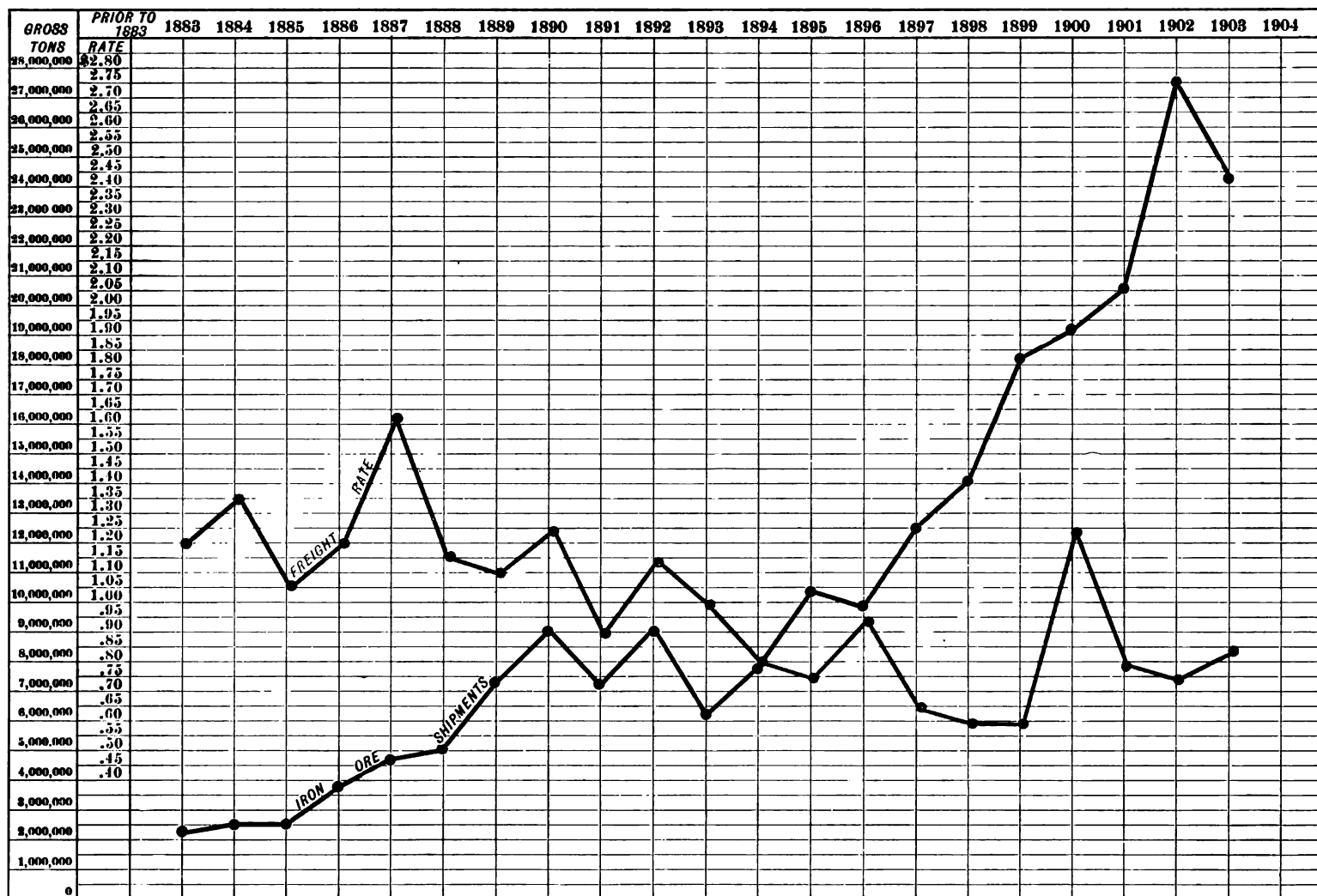
**THE PENNSYLVANIA RAILROAD, CLEVELAND, OHIO.**

a daily capacity of 35,000 to 40,000 tons from vessels to cars or docks.

on page 24.1



# LAKE SUPERIOR IRON ORE SHIPMENTS (GROSS TONS) AND FREIGHT RATES FROM 1883 TO 1903.



AMOUNT OF ORE SHIPPED PRIOR TO 1883- 20,271,682 TONS.

SHEET No. 27,906

DIAGRAM SHOWING DECREASE IN LAKE FREIGHT RATES WITH INCREASE IN TONNAGE FROM 1883 TO 1903.

This decrease in rates is almost entirely due to the "BROWNHOIST."



**"BROWNHOIST" TANDEM BRIDGE TRAMWAY, 584 FEET LONG.**

Coal-dock of HARRISON, TIDSWELL & COMPANY, Rouen, France. Brown Patent 54-cubic-foot Coal Grab-bucket.



**COALING-STATION OF THE UNITED STATES NAVY AT NEW LONDON, CONNECTICUT.**

Showing the United States Battleship "TEXAS" (second class) taking coal from stock-house. See next page.

## COALING-STATION OF THE UNITED STATES NAVY, NEW LONDON, CONNECTICUT.

(See picture on page 35.)

**D**ESCRIPTION. The coal-storage capacity is 10,000 tons, which is stored in a building the roof and sides of which conform to the natural slope of the coal-pile, 36 feet high, 300 feet long, and 108 feet wide.

The building is entirely of steel, with galvanized corrugated iron covering, granite retaining-walls, and concrete floor. There are thirty-eight hatches, each having counterweighted doors in the roof, each fifteen feet square, through which the coal is put into and taken out of the building. A railroad-track also extends into the building, and it can be entirely filled with coal from cars in case it is impossible, from any cause, to get it by boat.

**BRIDGE TRAMWAYS.** Two steam bridge tramways, each of 192-foot span, with a 102-foot cantilever extension over storage-building and with 34-foot front hinged apron, comprise the unloading and rehandling machinery. Each machine has a pair of standard scales arranged on the trolley-track, so that every load can be weighed. Heavy tarpaulins are provided to cover the hatches when handling coal in rainy weather.

A grab-bucket is used for transferring coal from vessels to buildings, and vice versa, together with our regular automatic dumping-tubs. An equipment of skips is also provided for handling the coal in bags.



COALING-STATION OF THE UNITED STATES NAVY AT DRY TORTUGAS ISLAND, OFF THE COAST OF FLORIDA.

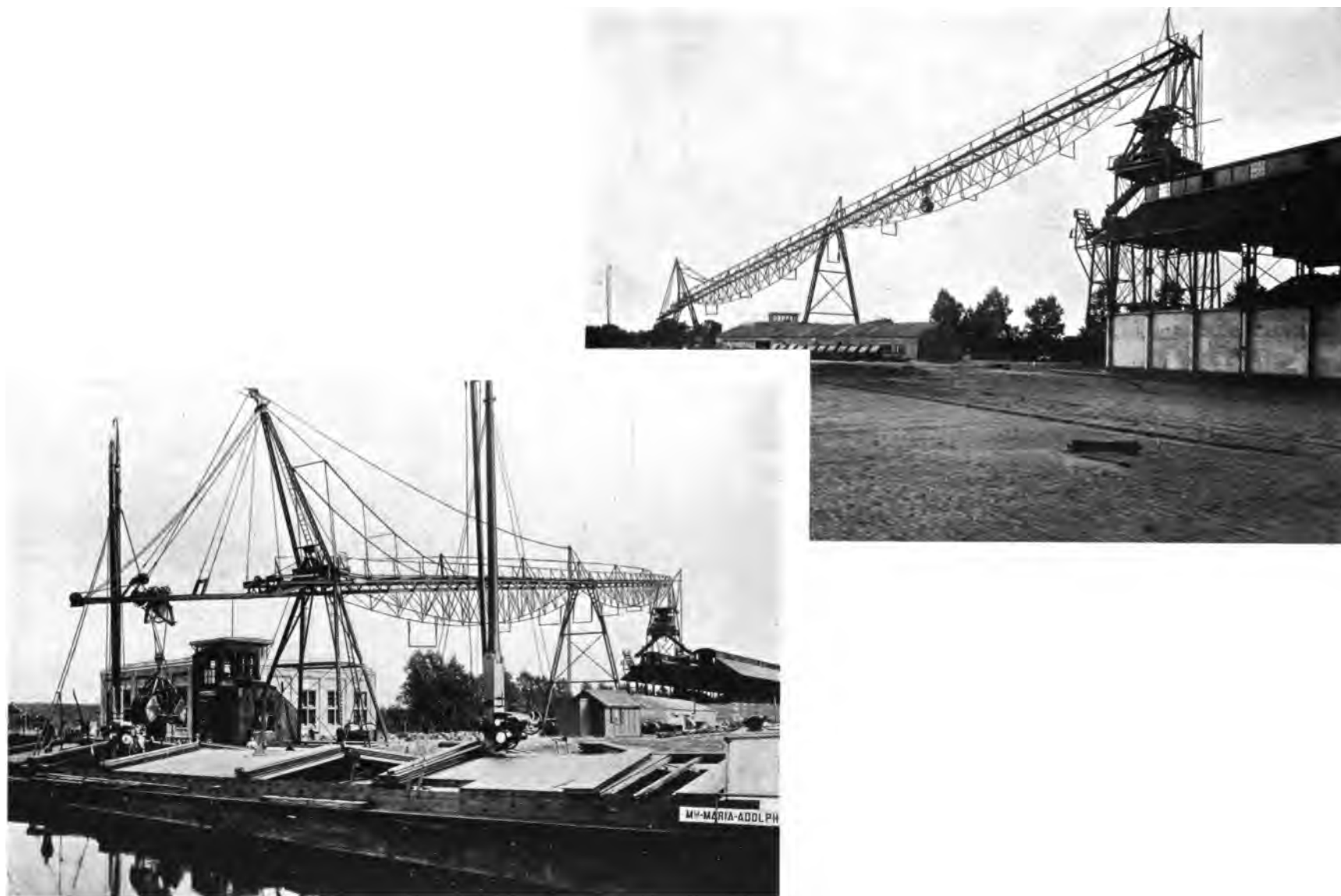
Showing old Fort Jefferson.

There are two coaling-stations, one at either end of the Island, each equipped with two "BROWNHOIST" Bridge Tramways with Grab-buckets.



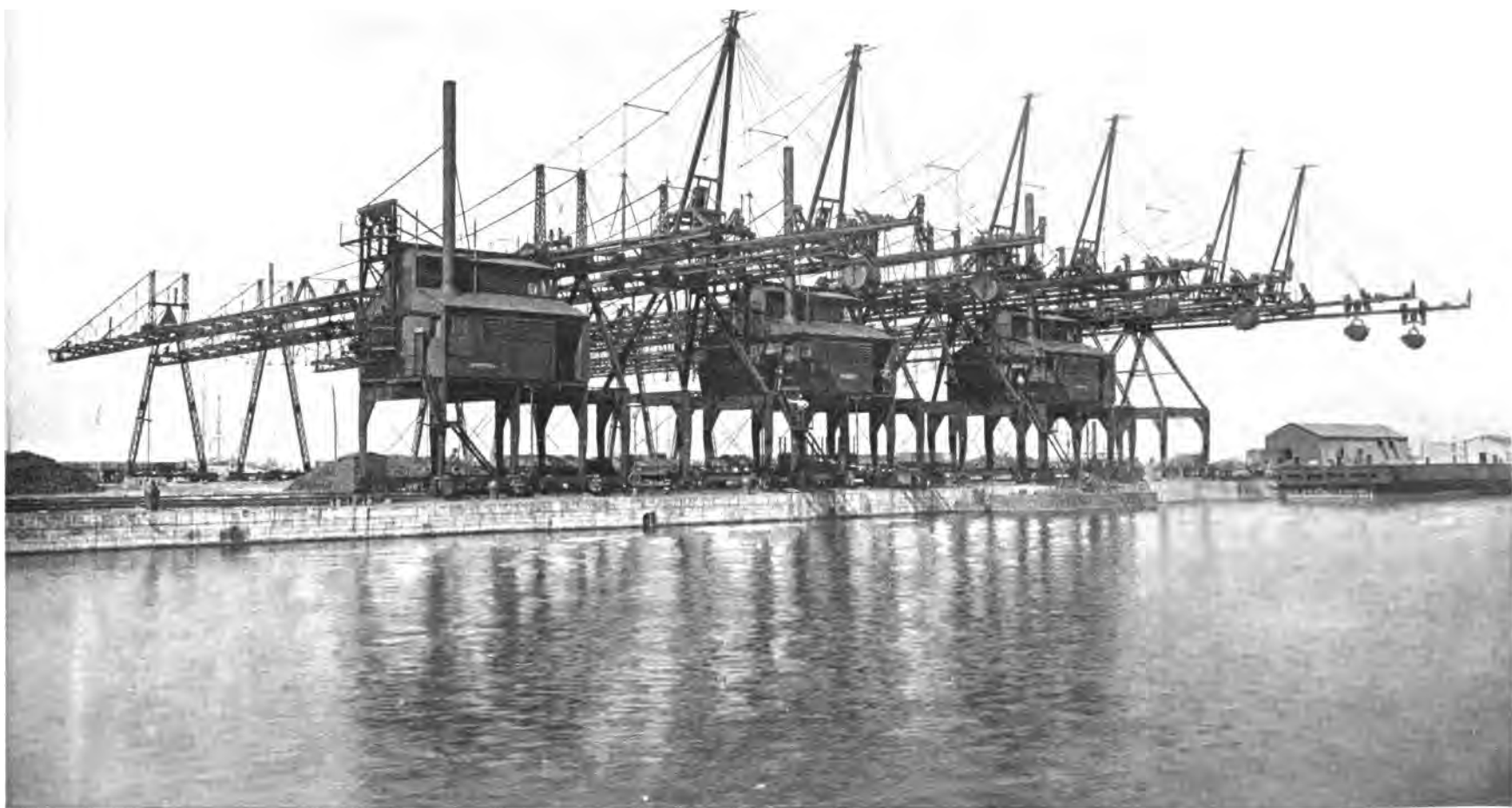
**PLANT OF THREE "BROWNHOIST" BRIDGE TRAMWAYS AND CANTILEVER CRANE.**  
Unloading coal at Genoa, Italy.





**TWO VIEWS OF "BROWNHOIST" FIXED BRIDGE TRAMWAY, 362 FEET LONG.**

Unloading coal and depositing same in gas-house. HAARLEM GAS WORKS, Haarlem, Holland



**PLANT OF FOUR "BROWNHOIST" BRIDGE TRAMWAY MACHINES.**  
EGYPTIAN STATE RAILWAYS, Alexandria, Egypt.

# PARTIAL LIST OF BRIDGE TRAMWAY PLANTS IN OPERATION.

## UNITED STATES.

United States Government: Key West, Dry Tortugas, New London, and Mare Island Naval Coaling-stations . . . . .	12 Bridges.
Erie Railroad: Various Stations . . . . .	39 "
Lake Shore & Michigan Southern Railway, Ashtabula, Ohio . . . . .	28 "
Lehigh Valley Railroad, Buffalo, New York . . . . .	6 "
Pennsylvania Railroad, Erie, Pennsylvania . . . . .	12 "
Philadelphia & Reading Coal & Iron Co.: Various Stations . . . . .	9 "
Pennsylvania Co., Cleveland, Ohio . . . . .	12 "
Pittsburg, Shenango & Lake Erie Co., Conneaut, Ohio . . . . .	3 "
Pennsylvania & Ohio Fuel Co., West Duluth, Minnesota . . . . .	3 "
Iroquois Furnace Co., South Chicago, Illinois . . . . .	4 "
Pittsburg & Conneaut Dock Co., Conneaut, Ohio . . . . .	6 "
Cleveland, Lorain & Wheeling Railroad, Lorain, Ohio . . . . .	6 "
Solvay Process Co., Detroit, Michigan . . . . .	2 "
Columbus, Hocking Valley & Toledo Railroad, Toledo, Ohio . . . . .	4 "
F. B. Baird, Buffalo, New York . . . . .	4 "
Coxe Bros. & Co.: Chicago, Illinois . . . . .	7 "
Roan, Pennsylvania . . . . .	1 "
Milwaukee, Wisconsin . . . . .	10 "
The Angeline Dock Co., Ashtabula, Ohio . . . . .	6 "
Western New York & Pennsylvania Railroad, Buffalo, New York . . . . .	2 "
Minnesota Dock Co., Ashtabula, Ohio . . . . .	2 "
American Steel Hoop Co., Etna, Pennsylvania . . . . .	2 "
Eastern Railway of Minnesota, West Superior, Wisconsin . . . . .	3 "
New Jersey Zinc Co., Hazard, Pennsylvania . . . . .	1 "
Morris Ellsworth & Co., Cleveland, Ohio . . . . .	15 "
Pennsylvania & Lake Erie Co., Fairport, Ohio . . . . .	8 "

## UNITED STATES—Continued.

The Ohio Coal Co., West Superior, Wisconsin . . . . .	3 Bridges.
The Mahoning & Shenango Dock Co., Ashtabula, Ohio . . . . .	8 "
Illinois Steel Co., South Chicago, Illinois . . . . .	16 "
Howard Plate Glass Co., Cochran, Pennsylvania . . . . .	1 "
Tonawanda Iron & Steel Co., Tonawanda, New York . . . . .	4 "
Youghiogheny River Coal Co., Ashtabula, Ohio . . . . .	3 "
West Newton Mines, Cleveland, Ohio . . . . .	3 "
Consumers' Forwarding & Storage Co., Fairport, Ohio . . . . .	9 "
Laughtins & Co., Pittsburg, Pennsylvania . . . . .	1 "
Pioneer Fuel Co., Duluth, Minnesota . . . . .	4 "
Columbia Chemical Co., Barberton, Ohio . . . . .	1 "
Northwestern Fuel Co., West Superior, Wisconsin . . . . .	3 "

## FRANCE.

Harrison Tidswell & Company, Rouen . . . . .	1 "
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## GERMANY.

Fried. Krupp, Rhinehausen . . . . .	3 "
-------------------------------------	-----

## AUSTRIA.

Krainische Industrie Gesellschaft, Trieste . . . . .	4 "
Prager Eisen Industrie Gesellschaft, Kladno . . . . .	1 "
Alpine Montangesellschaft, Vienna . . . . .	1 "

## RUSSIA.

Providence Russe, Mariupol . . . . .	8 "
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## SWEDEN.

Malmö Harbor Commission, Malmö . . . . .	2 "
Swedish Government Railways, Malmö . . . . .	1 "

## EGYPT.

Egyptian State Railways, Alexandria . . . . .	6 "
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## CUBA.

Havana Coal Co., Havana . . . . .	4 "
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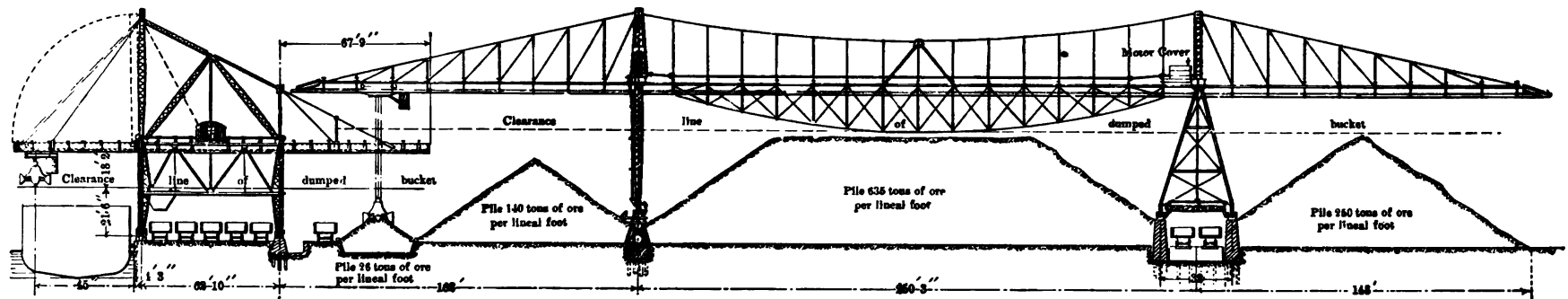
## HOLLAND.

Haarlemsche Machine Fabriek, Haarlem . . . . .	1 "
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## “FAST PLANTS.”

A “FAST PLANT” is an abbreviated form of “BROWNHOIST,” in which the storage (on the dock) feature is limited or entirely eliminated, and consists of any number of separate machines arranged in a row spanning two or more railroad-tracks, with arms or cantilevers extending beyond over other railroad-tracks, making it possible to have six or eight cars standing under each machine, loading “between shifts.”

**ADVANTAGES.** This type of machine has advantages over the regular bridge tramway, where all the unloading is done directly from vessels to cars. The machines are compact in form, and the bucket-movements are therefore short and fast; hence the name “FAST PLANT.”



“BROWNHOIST” FAST PLANT UNLOADERS AND STORAGE-BRIDGE, PITTSBURG AND CONNEAUT DOCK COMPANY, CONNEAUT, OHIO.  
Fast Plant Bucket capacity, 5 tons; bridge, 7 tons. Man-trolleys on both. (See pictures of this plant on pages 118 and 119.)

**DESCRIPTION.** All the machines comprising a “FAST PLANT” are independently adjustable to the hatches of a vessel. Each machine requires one operator, and, if operated by steam, a fireman to each machine. The mechanism and operation are precisely the same as described under “Bridge Tramway Plants.”

It will be seen from the illustrations that no available pier-space is taken up by a “FAST PLANT,” as invariably all the machinery, engines, and boilers are mounted in the engine-houses on top of machines and over the tracks.

The machines can be adjusted to the vessels’ hatches by hand for power, and they can be adapted to various localities and uses, as shown on the following pages.

## CLEVELAND "FAST PLANT." PENNSYLVANIA COMPANY.

ON PAGES 43 and 44 is shown a "FAST PLANT" on the Cleveland & Pittsburg Dock of the Pennsylvania Company, Cleveland, Ohio, handling iron ore. This plant consists of twelve machines capable of working twelve hatches of a ship at one time. Some of these machines cover five tracks and some seven tracks, and fifty cars can be loaded at one time, without shifting.

As fast as the cars are loaded they are made into trains and replaced with "empties." No time is lost in this operation, for, having so many cars under each machine, there are always empty cars waiting.

There is no storage-room under these machines, the entire space being covered with tracks. The plant is operated by steam-power, the adjustment to the hatches only being by hand-power.



"FAST PLANT" LOADING INTO BOX CAR FROM CANAL-BOAT.

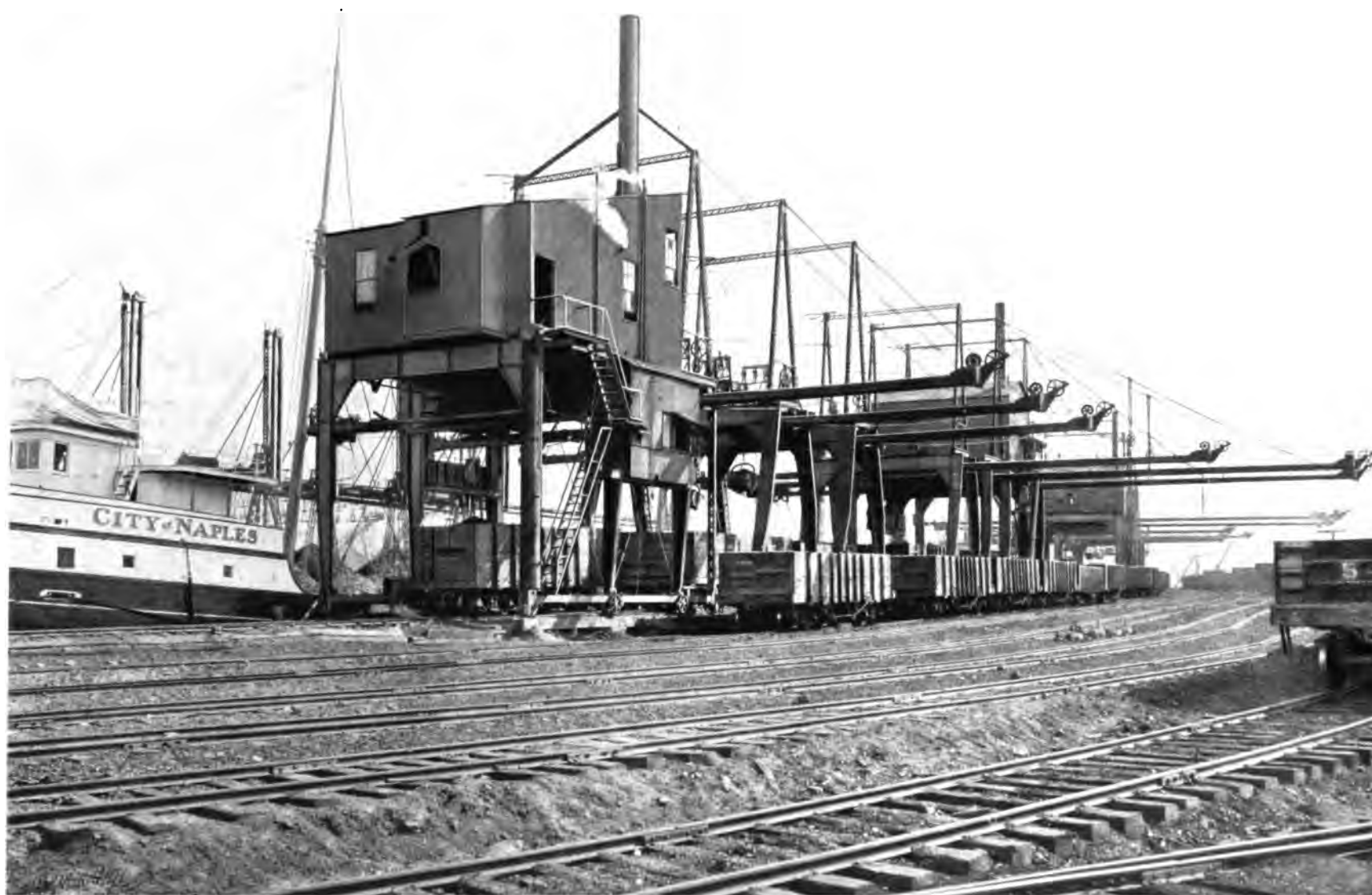
## ERIE "FAST PLANT." PENNSYLVANIA COMPANY.

ON PAGES 47 and 49 is shown a "FAST PLANT" of twelve machines built for the Pennsylvania Company, Pittsburg & Erie Docks, Erie, Pennsylvania, for unloading ore, which differs from the Cleveland & Pittsburg plant described above, inasmuch as this plant has some storage capacity—enough room under the cantilevers to store the cargoes of one or two large vessels directly on the dock in case there are no cars at hand to load into. At the same time, the machines span four tracks and always load into cars unless there are none.

The cantilever extensions over the dock are eighty feet long, and the machines rehandle the ore from dock to cars with the same rapidity and ease as from vessels to cars.



**CLEVELAND "FAST PLANT,"**  
PENNSYLVANIA COMPANY.



**CLEVELAND "FAST PLANT."**  
PENNSYLVANIA COMPANY. Showing cars being loaded from vessel.



**"FAST PLANT" OF TWO MACHINES, WITH CANTILEVER EXTENSIONS, OPERATING GRAB-BUCKETS.  
MILWAUKEE COKE AND GAS COMPANY, Milwaukee, Wisconsin.**





DETAILS OF CONSTRUCTION, ERIE  
"FAST PLANT."

In this plant, which is operated by steam, the machines are arranged in groups, each pair being built together and operated from one engine-house. Each machine is adjustable to the ship's hatch by its own power.

### ELECTRIC "FAST PLANT." UNITED STATES STEEL COMPANY, CONNEAUT HARBOR, OHIO.

ON PAGE 50 is shown a "FAST PLANT" of four machines, each operating an 80-cubic-foot "BROWNHOIST" Ore Grab-bucket and man-riding trolley. Each trolley has a turntable for rotating the bucket to any position for grabbing the load. These four machines unload vessel directly into cars or to storage bridge shown on pages 118 and 119. These machines easily make complete round trips of bucket in forty seconds.

### PIER J "FAST PLANT." PENNSYLVANIA RAILROAD, JERSEY CITY, NEW JERSEY.

ON PAGE 51 is shown a five-ton single-machine "FAST PLANT," operated by steam, on the Pennsylvania Railroad, Pier J, Jersey City, New Jersey, for handling general merchandise to and from cars, lighters, and ships.

DESCRIPTION. The machine is of our regular "FAST PLANT" construction, having hinged aprons over either side of pier, and machinery, boiler, and engine overhead. The machine spans two tracks, reaching over a third track. This arrangement was made so that steel rails or other long material could be handled on one side without having to pass through the legs of the machine.

The length of the pier is 1,000 feet and the width 35 feet. The hinged projections, or aprons, over vessel are on either side 36 feet.



VIEW THROUGH CANTILEVER, SHOWING  
CONSTRUCTION.



**ERIE "FAST PLANT."**  
PENNSYLVANIA COMPANY.



THREE-DRUM ENGINE FOR OPERATING "FAST PLANT."

**SPEEDS.** The entire machine travels by power along the dock (this to change location for working), and will lift the full load of five tons 200 feet per minute, and will trolley same 1,000 feet per minute.

**LOADING INTO BOX CARS.** The picture on page 42 shows this machine loading sulphur into a box car, using a special chute for this purpose, which chute, when not in use, is carried on the machine, as shown in the upper picture on page 51. Great quantities of kaolin, clay, sulphur, pyrites, ore, and other minerals, are handled by this machine and loaded into box cars in this manner. Other merchandise handled includes boxes, barrels, telegraph-poles,

ties, lumber, pipe, machinery, launches, boilers, bags, cars, steel rails, etc., etc.

## PARTIAL LIST OF "FAST PLANTS" IN OPERATION.

### UNITED STATES.

Pennsylvania Company, Cleveland, Ohio, one plant of twelve machines, operated by steam, on the Cleveland & Pittsburg Railroad Docks.

Pennsylvania Company, Erie, Pennsylvania, one plant of twelve machines, operated by steam, on the Pittsburg & Erie Railroad Docks.

Pennsylvania Railroad, Jersey City, New Jersey, one plant of one machine, five tons capacity, for handling general merchandise, on Pier J.

Buffalo, Rochester & Pittsburg Railroad, Buffalo, New York, one plant of two machines, operated by steam.

Philadelphia & Reading Railroad, Philadelphia, Pennsylvania, one plant of two machines, operated by electricity.

New York Central & Hudson River Railroad, Port Morris, New York, one plant, one machine, steam.

Semet Solvay Co., Milwaukee, Wisconsin, one plant of two machines, operated by steam.

Youngstown Steel Co., Gracetown, Pennsylvania, one plant of one machine, operated by steam.



TWO-DRUM ENGINE FOR OPERATING "FAST PLANT."



ORE-VESSEL DISCHARGING.



PULLING OUT LOADED CARS.



SHOWING ORE-STORAGE ROOM ON DOCK.



CARNEGIE DOCK IN THE DISTANCE, SHOWING "BROWNHOISTS."

ERIE "FAST PLANT."  
PENNSYLVANIA COMPANY.



**"BROWNHOIST" "FAST PLANT" ORE-UNLOADERS, WITH MAN-TROLLEYS AND 80-CUBIC-FOOT GRAB-BUCKETS.**

UNITED STATES STEEL COMPANY, Conneaut, Ohio.

See also pages 118 and 119, showing Storage Bridge used in connection with these "Fast Plant" machines.





**PIER J "FAST PLANT."**  
PENNSYLVANIA RAILROAD, Jersey City, New Jersey.



**"BROWNHOIST" "FAST PLANT" UNLOADERS AND STORAGE-BRIDGES.**

NORTHWEST FUEL COMPANY, West Superior, Wisconsin.

Coal is taken from vessel by the "Fast Plant" machines and is transferred to the storage-bridges. The "Fast Plants" and bridges work independently of each other.



**"BROWNHOIST" "FAST PLANT" UNLOADERS AND STORAGE-BRIDGES.**  
NORTHWEST FUEL COMPANY, West Superior, Wisconsin. Unloading the "AUGUSTUS B. WOLVIN." (See also page 54.)





**HOLD OF STEAMER "AUGUSTUS B. WOLVIN."**

Unloading at NORTHWEST FUEL COMPANY'S DOCK, West Superior, Wisconsin. (See also page 53.)  
The largest cargo-carrier on the Great Lakes. Length, 560 feet; beam, 56 feet; draft, 19 feet; tonnage, 10,000; number of hatches, 33.



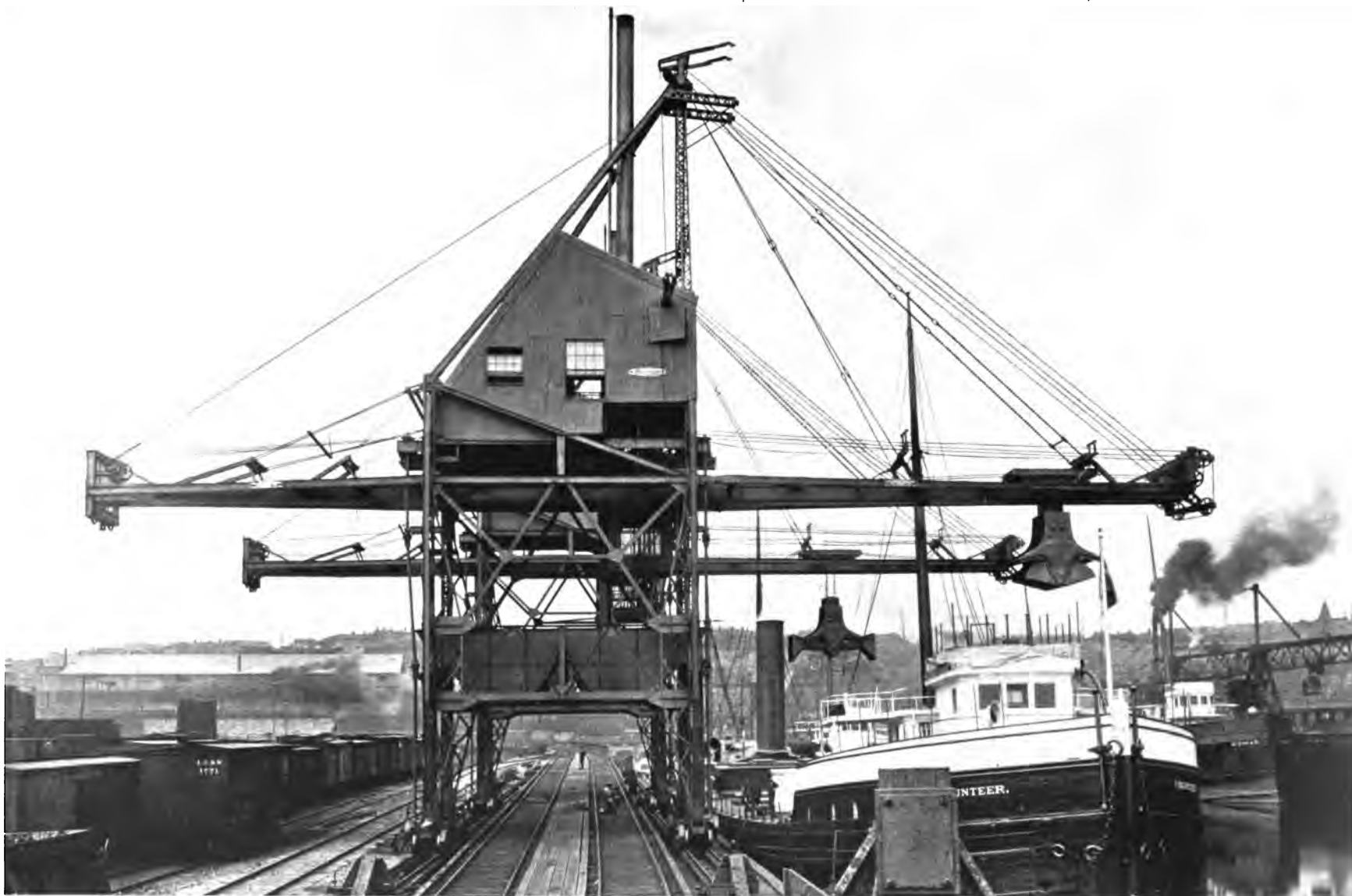
**PORT MORRIS "FAST PLANT."**

NEW YORK CENTRAL & HUDSON RIVER RAILROAD, foot of East One Hundred and Forty-second Street, New York City.  
Handling coal, ore, and general merchandise. Operates 100-cubic-foot Grab-bucket. Lifting capacity, 5 tons.



**PORT RICHMOND "FAST PLANT."**

PHILADELPHIA & READING RAILWAY, Philadelphia, Pennsylvania. Electric, 3 tons capacity. Handles coal, ore, and general cargo.



**"FAST PLANT" OPERATING 5-TON ORE GRAB-BUCKETS.**  
At CLEVELAND FURNACE COMPANY DOCKS, Cleveland, Ohio.

## PARTIAL LIST OF "FAST PLANTS" IN OPERATION — Continued.

### UNITED STATES—Continued.

Pittsburg & Conneaut Dock Co., Conneaut, Ohio, one plant, four machines, operated by electricity.  
Cleveland Furnace Co., Cleveland, Ohio, one plant, two machines, operated by steam.  
Northwestern Fuel Co., West Superior, Wisconsin, one plant, three machines, operated by electricity.  
Milwaukee Gas Light Co., Milwaukee, Wisconsin, three machines, operated by electricity.  
Pennsylvania Railroad Co., Buffalo, N. Y., two machines, operated by electricity.

### SWEDEN.

Oxelösund Flen Westmanlands Railway, Eskilstuna, one plant of two machines, operated by steam-power.  
Graham Brothers, Stockholm, one plant of two machines, operated by steam, Gefle Harbor.

### JAPAN.

Kiushiu Railway, Moji, two machines, operated by steam.

### AUSTRALIA.

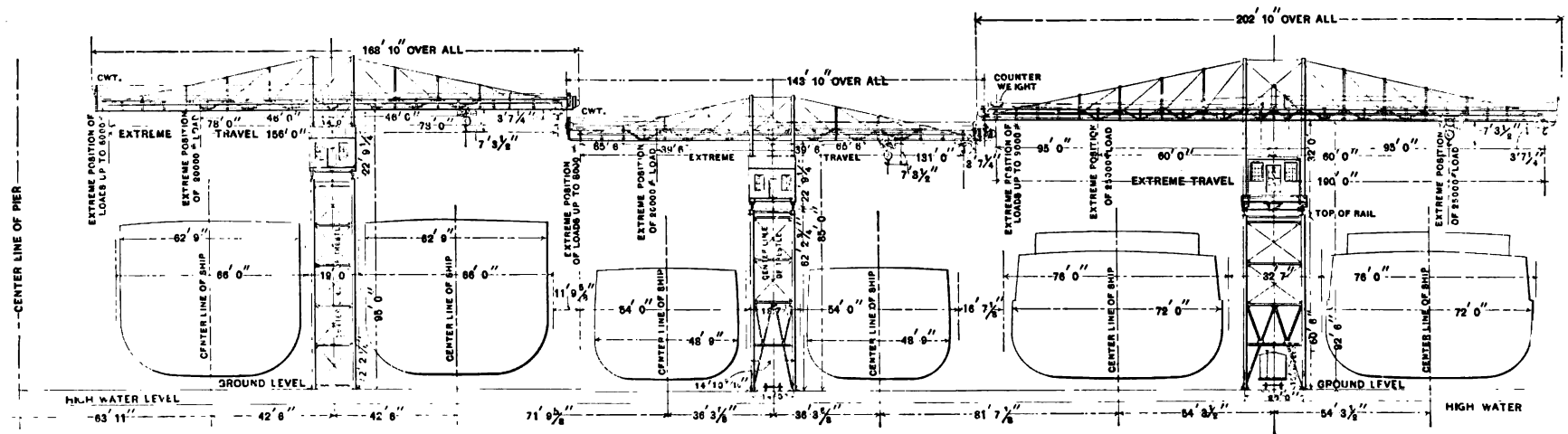
Queensland Government Railways, Brisbane, one machine, operated by steam.



"BROWNHOIST" "FAST PLANT." AT GEFLE, SWEDEN.

## CANTILEVER CRANES.

**T**HE BROWN PATENT BALANCED CANTILEVER CRANES shown herewith are the most perfect machines yet devised for handling material about ships in the course of construction, or for handling structural or other material in storage-yards, or for loading cars, etc., and have been successfully put to many other uses, as shown on the following pages. These cranes were designed and patented by Mr. Alexander E. Brown, Vice-President and Engineer of this Company, and



ARRANGEMENT OF THREE CANTILEVER CRANES IN A SHIPYARD, COVERING SIX SHIPS.

all the cranes of this type in successful operation in this country and abroad were built by us. They embody entirely new features in crane-construction, which allow the long spans and high speeds for which they are designed and equipped.

**MOTIVE POWER.** One pair of engines (or an electric motor), with the necessary drums and special friction-clutches controlled by one operator, drives all functions of the crane. The engines (or motor) and machinery are located on the pier; there is no dead-weight of motors or machinery carried either on the bridge or on the trolley, as in all other power-cranes. This allows the lightest form of bridge-construction and very quick movement of trolley, and especially allows the trolley to be run at full speed, or stopped instantly, which can not be done with the ordinary type of trolley carrying its own motors, gears, and other machinery, which alone are a dead-weight of several tons.

**COUNTERWEIGHT.** These Cantilever Cranes are equipped with an automatic counterweight running on a track located on the bridge, above the hoisting-trolley tracks, and connected by ropes to the trolley, so that whatever position the hoisting-trolley may occupy on one arm of the crane, the counterweight at all times automatically keeps a similar position on the opposite arm. This position of the counterweight for extra-heavy loads is capable of still further manipulation by the operator in order to obtain a double purchase.

**GIRDERS.** The girders, or bridge-trusses, are of our patented construction, designed for maximum strength with minimum weight of material, with the members so placed as to offer but little wind-surface.

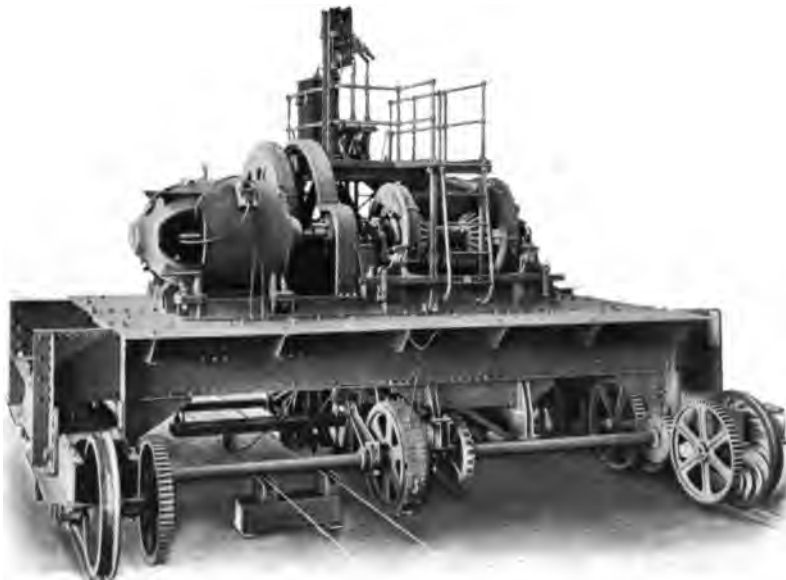
**CANTILEVER CRANES ARE OF THREE TYPES, AS FOLLOWS:**

TRAVELING, with hoisting and racking motions.

REVOLVING, with hoisting and racking movement.

TRAVELING AND REVOLVING, with hoisting and racking movement.

Any of the above can be fitted with either one or two independent trolleys traveling on parallel runways. They are generally fitted with one trolley. Each type is capable of further modification, to meet almost any requirement or condition. On the following pages are shown some of the Cantilever Cranes we have constructed.

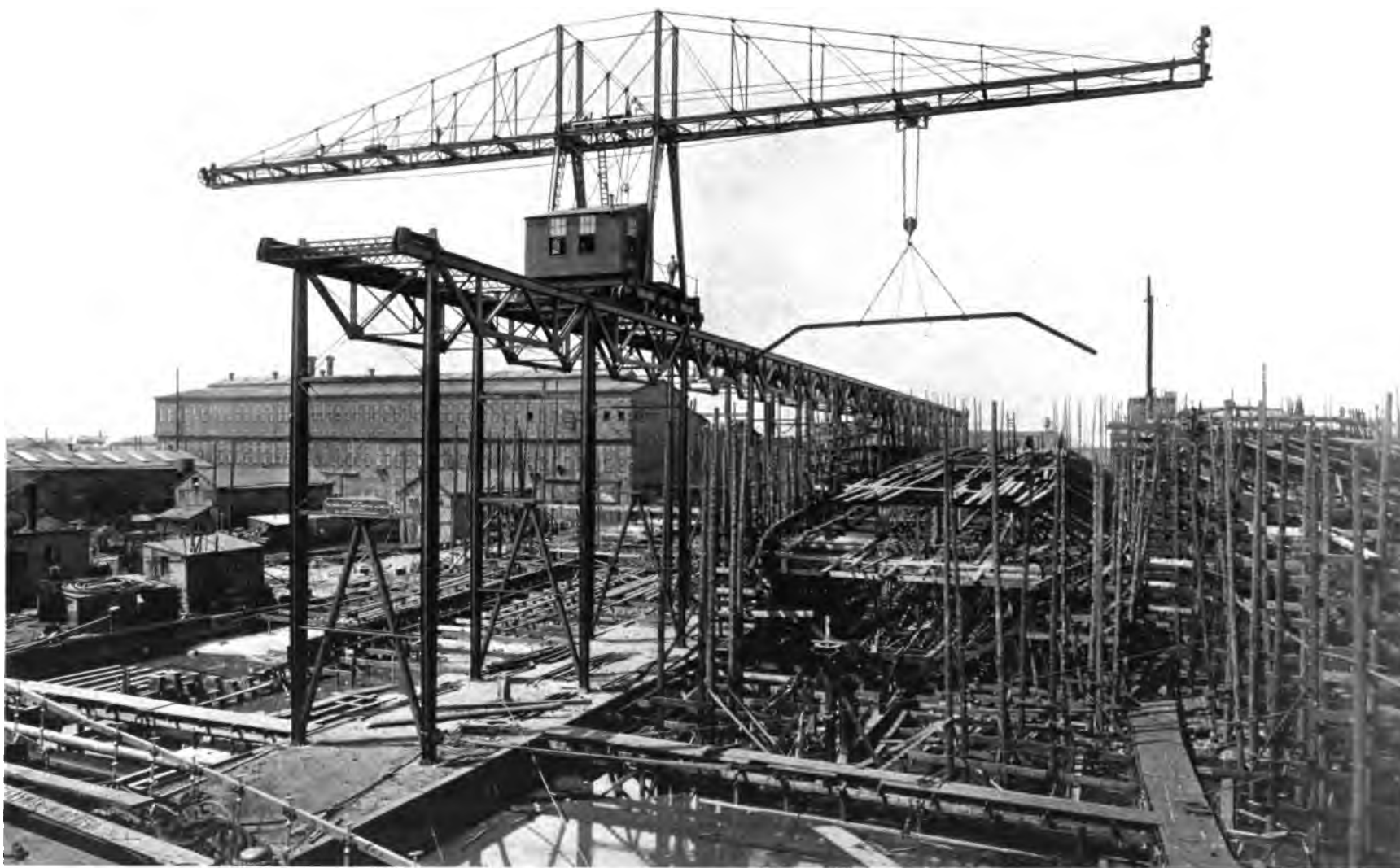


ELECTRIC DRIVING-MECHANISM AND PORTION OF PIER  
CANTILEVER SHIPBUILDING CRANE.

**CANTILEVER CRANES. THE WILLIAM CRAMP  
& SONS SHIP AND ENGINE BUILDING  
COMPANY, PHILADELPHIA,  
PENNSYLVANIA.**

**W**HEN THIS installation is complete, there will be four Cantilever Cranes, covering eight shipways. All these cranes are to be driven by electricity, and three of them are now in operation.



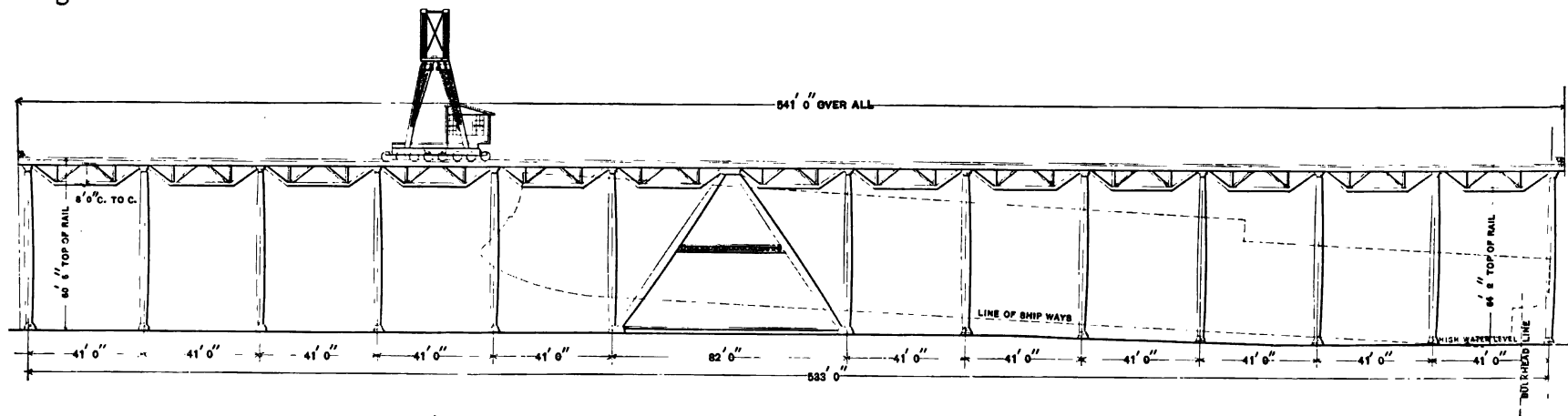


**"BROWNHIST" ELECTRIC CANTILEVER SHIPBUILDING CRANE.**  
THE WILLIAM CRAMP & SONS SHIP AND ENGINE BUILDING COMPANY, Philadelphia, Pennsylvania.  
Keel of the United States Battleship "MAINE" on the left; Russian Battleship "RETVIZAN" on the right.



DESCRIPTION. Each crane is mounted on a steel trestle of our own special design and construction, about 600 feet long, and of sufficient height to bring the under side of crane-girder 105 feet above the ground.

The crane shown on page 67 is termed the "Battleship Crane," and is 202 feet long from end to end of girders, with 190 feet effective travel of trolley. It will lift 30,000 pounds at 60 feet either side of the center, and 9,000 pounds at either end of bridge.



SIDE ELEVATION OF STEEL TRESTLE FOR CANTILEVER SHIPBUILDING CRANE.

SPEEDS. A single electric motor, mounted as shown on page 60, with suitable gears, clutches, and operating-levers, operates all the functions of the crane, and at the following speeds :

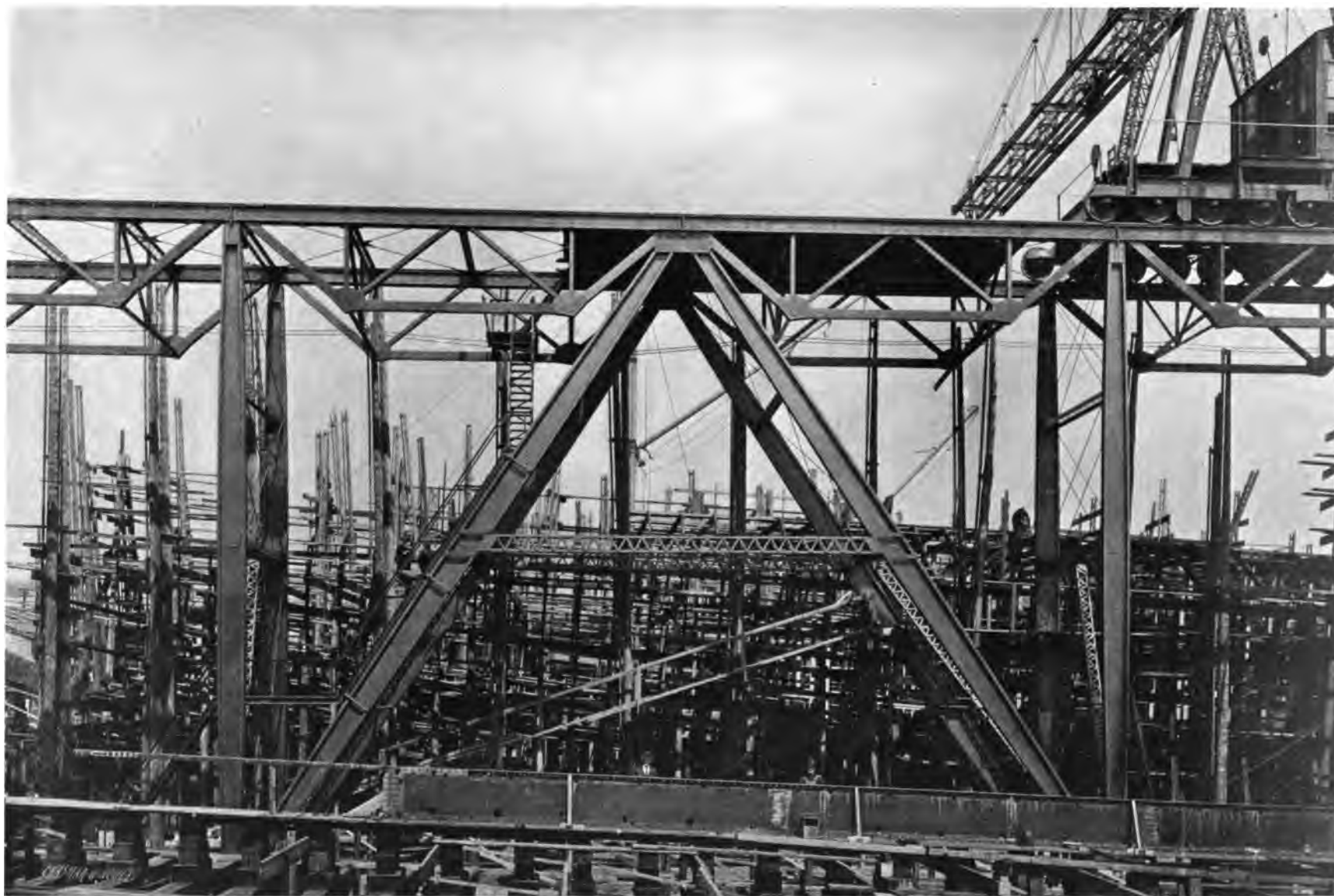
Hoisting full load (30,000 pounds), 125 feet per minute.

Hoisting 10,000 pounds, 350 feet per minute.

Hoisting 1,000 pounds, 700 feet per minute.

Trolley across cantilever, 400 to 800 feet per minute, according to the load.

Entire crane along trestle, 400 to 700 feet per minute, depending on load and wind-pressure. The minimum of 400 feet per minute is with full load and against a wind-pressure of 30 miles per hour.



**"BROWNHOIST" ELECTRIC CANTILEVER SHIPBUILDING CRANE.**  
THE WILLIAM CRAMP & SONS SHIP AND ENGINE BUILDING COMPANY, Philadelphia, Pennsylvania. Showing detail of central pier of trestle.

**TRESTLE.** The steel trestles were designed especially for this service by Mr. Alexander E. Brown of this Company, and embody new features in construction. They are, like the cranes, entirely of steel. The columns are pinned at the bottom to the foundations and the bridge-trusses set on top of these columns on "knife-edges." These trusses, forming the runways, are held in place endwise by two main diagonal posts or struts at the center of the trestle, as shown on page 62. These are pinned at the apex formed by them, and at their base to the foundation, thus making this center position of the trestle a fixed point from which the bridge-trusses are free to expand each way, due to the lower pinned connections with the vertical posts and the upper "knife-edge" detail before mentioned. The trestle is so designed as to leave a free and clear space under it for machine-tools, storage, or railroad-tracks.

The gauge of track on trestle on which the crane runs is 20-foot.

One of these Cantilever Cranes at Cramp's Shipyard placed the stern-post of the Russian battleship "RETVIZAN," weighing 18 tons, in about 20 minutes, taking it from cars at front end of yard, with but a few men—an operation never before accomplished in less than two or three days, and with many men—illustrating in a single item the great saving a Cantilever Crane can effect about a shipyard.

## **CANTILEVER CRANES. NEWPORT NEWS SHIPBUILDING AND DRY DOCK COMPANY, NEWPORT NEWS, VIRGINIA.**

**T**HIS EXTENSIVE shipyard is equipped with four of our Balanced Cantilever Shipbuilding Cranes and one of our Balanced Cantilever Traveling and Revolving Yard Cranes, the latter used for taking material to the shipbuilding cranes and for general yard-work. Three of these cranes are operated by electricity, and the other two by steam.

**DESCRIPTION.** There are four runways parallel to each other, covering eight shipways. Each runway is about 700 feet long, with a total height from the ground to underside of crane-girder of 105 feet.

**SPEEDS.** The speeds of cranes furnished the Newport News Shipyard are as follows:

Entire crane along runway, with load of 9,000 pounds, 89 feet from center, 750 feet per minute.

Entire crane along runway, with load of 28,000 pounds, 55 feet from center, 690 feet per minute.

Hoisting full load (28,000 pounds), 200 feet per minute:

Hoisting empty hook, 400 feet per minute.

Trolley, 400 to 800 feet per minute.



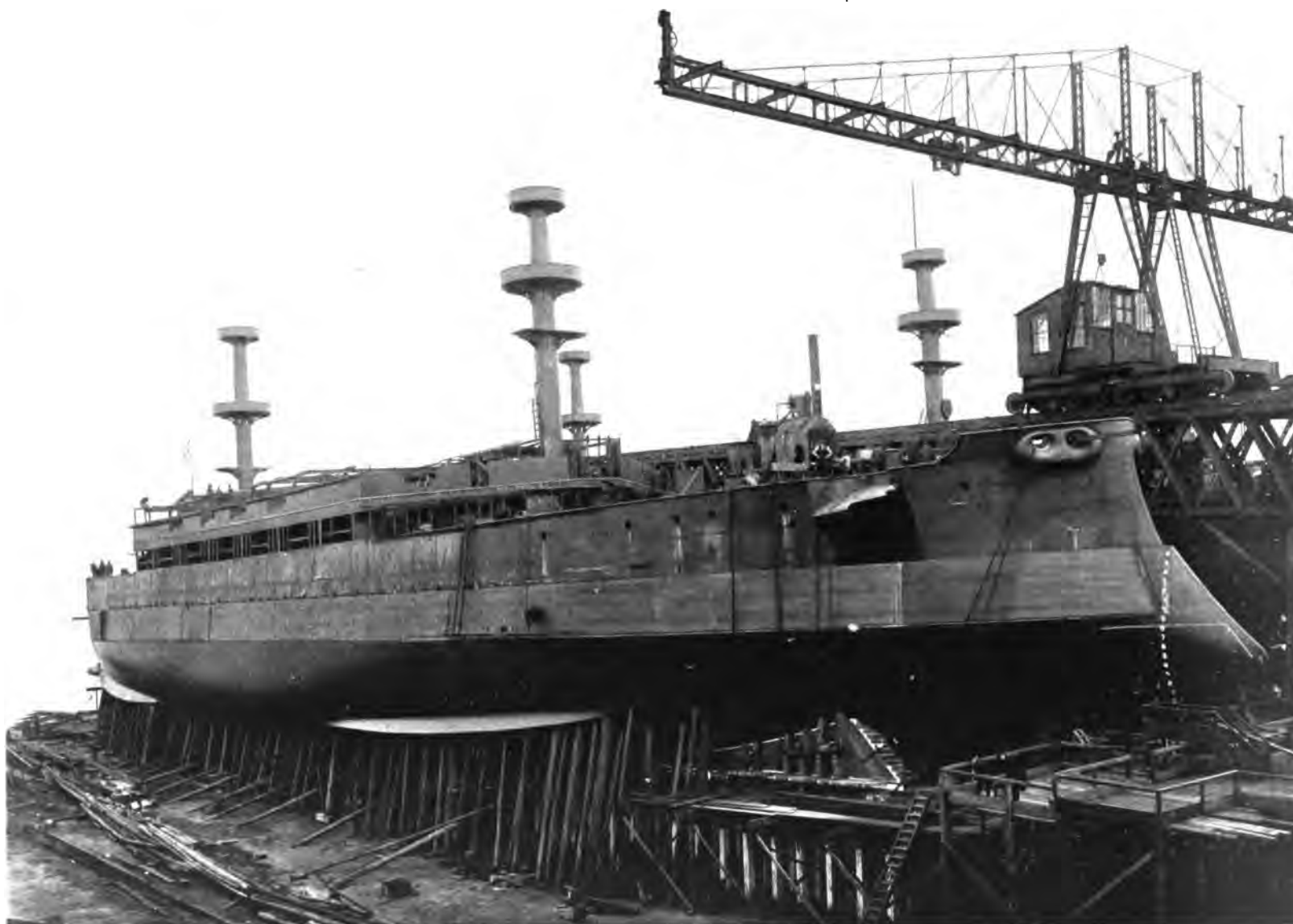


**" BROWNHOIST " ELECTRIC**  
**THE WILLIAM CRAMP & SONS SHIP AND**  
Showing the launching of the U.S.



**CANTILEVER SHIPBUILDING CRANE.**  
ENGINE BUILDING COMPANY, Philadelphia, Pennsylvania.  
United States Battleship "PENNSYLVANIA."





**"BROWNHOIST" ELECTRIC CANTILEVER SHIPBUILDING CRANE.**

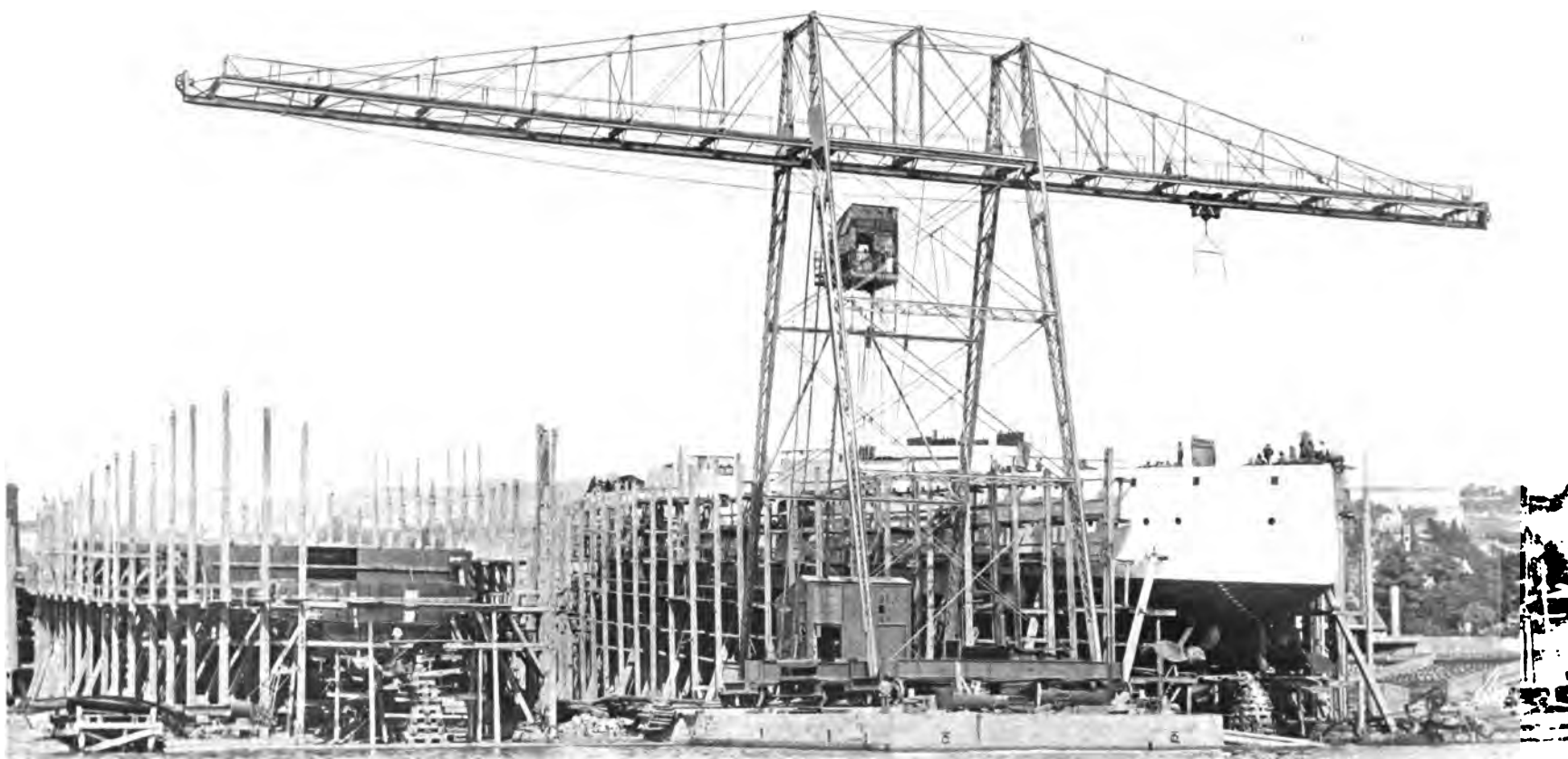
NEWPORT NEWS SHIPBUILDING AND DRY DOCK COMPANY, Newport News, Virginia. United States Battleships "KEARSARGE" and "KENTUCKY" under



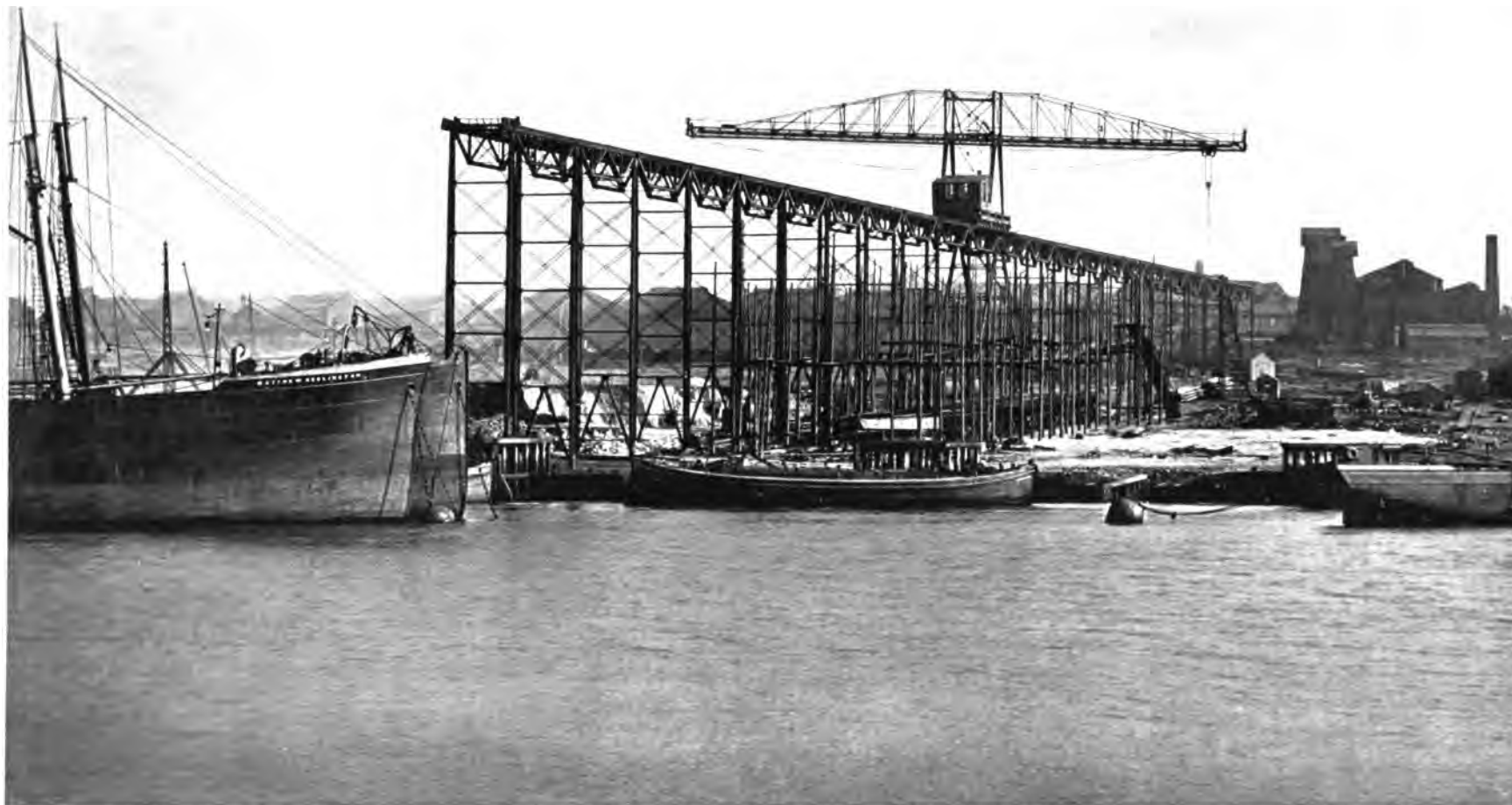


**"BROWNHOIST" ELECTRIC CANTILEVER SHIPBUILDING CRANES AND TRESTLE.**

"Brownhoist" Patent Riveter-cranes — running on sides of trestle. HARLAND & WOLFF, Belfast, Ireland.



**"BROWNHOIST" ELECTRIC CANTILEVER SHIPBUILDING CRANE.**  
STABILIMENTO TECNICO TRIESTINO, Trieste, Austria.



**"BROWNHOIST" ELECTRIC CANTILEVER SHIPBUILDING CRANE.**  
ROBERT STEVENSON & SON, Newcastle-on-Tyne, England.



**"BROWNHOIST" ELECTRIC CANTILEVER SHIPBUILDING CRANE.**  
UNITED STATES GOVERNMENT, New York Navy Yard, Brooklyn, New York. 16,000-ton Battleship "CONNECTICUT" on ways.



**"BROWNHOIST" ELECTRIC CANTILEVER SHIPBUILDING CRANE.**  
VICKERS SONS & MAXIM, Barrow-in-Furness, England.



LOADING SKIPS FOR CANTILEVER CRANES ON CHICAGO DRAINAGE CANAL.

the base of the pier beneath the cantilever, and have sufficient power to propel the entire crane along a portable track on the berm at a speed of 200 to 300 feet per minute, and also to hoist the loaded bucket at 300 to 400 feet per minute and convey it along the cantilever at 900 to 1,200 feet per minute. A walk, or passageway, is arranged directly above the track for convenience in keeping the cables in good shape, oiling the pulleys, and looking after the machine generally. One of the best features of this machine is the fact that its construction enables the operator to keep all points of the work in plain view. A convenient operator's cabin is arranged directly above the engine-house, and from this point he can see every part of the work under excavation, and also the spoil-bank. This does away with any system of signaling, liable to be attended with mistakes which might result in injury to the workmen or breakage to the machinery. Another advantage of this machine is the rapidity with

## CANTILEVER CRANES. CHICAGO DRAINAGE CANAL (DURING CONSTRUCTION IN 1892-1897), CHICAGO, ILLINOIS.

**T**HE TYPE of Cantilever Crane designed for use on the Chicago Drainage Canal, for handling material during construction, is shown on pages 76 and 79.

**DESCRIPTION.** The lower chords carry a track, or runway, for the trolley, which is arranged for conveying loaded buckets from any point in the excavation to any part above the spoil-bank, or dump. The cantilever is 353 feet long, and the height sufficient to allow of a spoil-bank 80 feet high. The cantilever is mounted on a substantial framework, and the entire structure placed on trucks having a total wheel-base of 37 feet. The engine and boiler are placed in



TYPE OF ENGINE USED ON CANTILEVER CRANES ON CHICAGO DRAINAGE CANAL.





**"BROWNHOIST" CANTILEVER CRANES.**  
CHICAGO DRAINAGE CANAL.







**" BROWNHOIST " CANTILEVER CRANE**  
Showing two machines at work and spoil-bank. Length of crane, 353 feet. Width of



**CRANES ON CHICAGO DRAINAGE CANAL.**

Height of canal, 162 feet; depth, 36 feet. Spoil-bank, 80 feet high, 240 feet wide at base.





AUTOMATIC DUMPING-SKIP USED ON THE CANTILEVER CRANES  
ON CHICAGO DRAINAGE CANAL.

which the buckets can be moved and the absolute control the operator has over them. When the empty bucket is being lowered into the pit it drops at a speed which would indicate that the cable had parted; but it is invariably checked before reaching the ground and brought gently to rest. As the bucket rests on the ground the bail is detached and is ready to be attached to another bucket for hoisting, as shown in the accompanying picture.

**BUCKETS.** The buckets or skips, shown in picture, are of the same style as our coal-buckets, but much larger, each having a capacity of 75 cubic feet. When loaded they will hold  $1\frac{3}{4}$  yards of solid rock in place, or about  $3\frac{1}{2}$  tons.

**OPERATION.** The rock is loaded into a bucket by hand, and the bail which hangs from the bottom block is then attached to the bucket. When the bucket is hoisted by the operator the bottom block automatically hooks into the trolley, and the weight of both the bucket and bottom block is then carried directly by the trolley. The trolley is then run to any point over the spoil-bank, where it is desired to dump the load, and a stop for dumping having been previously fixed at that point, the load is automatically discharged by the bucket turning over. The empty bucket rights itself and returns by gravity to the starting-point.

**CAPACITY.** There were eleven of these machines at work on the canal—three of them on Section 10, the others on Sections 11, 12, and 13. The amount of material removed by eight of them during the month of July, 1894, was as follows:

Cantilever Number.	Section.	Cubic Yards. (Solid Rock in Place.)
1 and 2	13	28,600
3 and 4	13	27,800
5 and 6	12	29,300
7	11	15,600
8	11	14,200
		Total, 115,500

The average working-time for each machine during the month was  $22\frac{1}{4}$  days, and the average amount removed by each was 14,438 cubic yards. The total number of loads taken out was 66,067, and the weight was 231,235 tons. The greatest record made for one machine for one week is credited to Machine No. 5 for the week from July 16 to 21, inclusive. During that time this machine took out 2,769 loads, which is equal to 4,845 cubic yards.

**BEST RECORDS.** The best record in 1894 for a single day was also made by this machine on July 21, when 510 loads, or 892.5 cubic yards, "solid rock in place" were taken out. The best record in 1895 was May 30, when No. 4 moved 550 loads, or 960 cubic yards, "solid rock in place" in  $9\frac{3}{4}$  hours actual working-time of Cantilever, 52 men in cut. On June 19, 1895, the same machine moved 540 loads in  $9\frac{3}{4}$  hours, 47 men in cut. These records were given by the Engineer of the Sanitary District having charge of the work.

The tracks on which the cranes are operated are within the limits of the berm specified by the Drainage Commission, parallel to the channel, and the cranes can be used for transferring the stone of the waste-pile to boats on the canal for shipment, as they handle material equally well in both directions.

These machines show a fine example of the working out of a problem, for they met every condition, and were pronounced by the Chief Engineer of the Chicago Drainage Canal as the "most perfect machine" of all the various "contrivances" for handling material on this important engineering work.

## THE BROWN PATENT BALANCED CANTILEVER TRAVELING AND REVOLVING CRANE.

**T**HE PICTURES on pages 86 and 87 show Brown's Patent Balanced Cantilever Traveling and Revolving Crane for general yard service, the picture on page 87 showing one of the cranes at the works of the Newport News Shipbuilding and Dry Dock Company, Newport News, Virginia, used in unloading iron and machinery from cars and transferring same from point to point around the shipyard and in delivering material to the Brown Cantilever Shipbuilding Cranes already described.

**DIMENSIONS.** The length of overhead tramway is 130 feet, or 65 feet radius. Gauge of track, 20 feet. Working load, 3 to 10 tons.



**"BROWNHOIST" 5-TON CANTILEVER CRANE.**  
SOLVAY PROCESS COMPANY, Detroit, Michigan. Length of crane, 353 feet. Height under girders, 70 feet.





**"BROWNHOIST" 5-TON TWO-TROLLEY CANTILEVER CRANE.**  
AACHENER HUETTEN ACTIEN VEREIN, Rothe Erde, Germany. Length of crane, 320 feet. Height under girders, 25 feet. Operated by electricity.



**"BROWNHIST" 5-TON REVOLVING CANTILEVER CRANE.**

JONES & LAUGHLINS, Limited, Pittsburg, Pennsylvania. Length of crane, 308 feet Height under girders, 52 feet.

## SPEEDS.

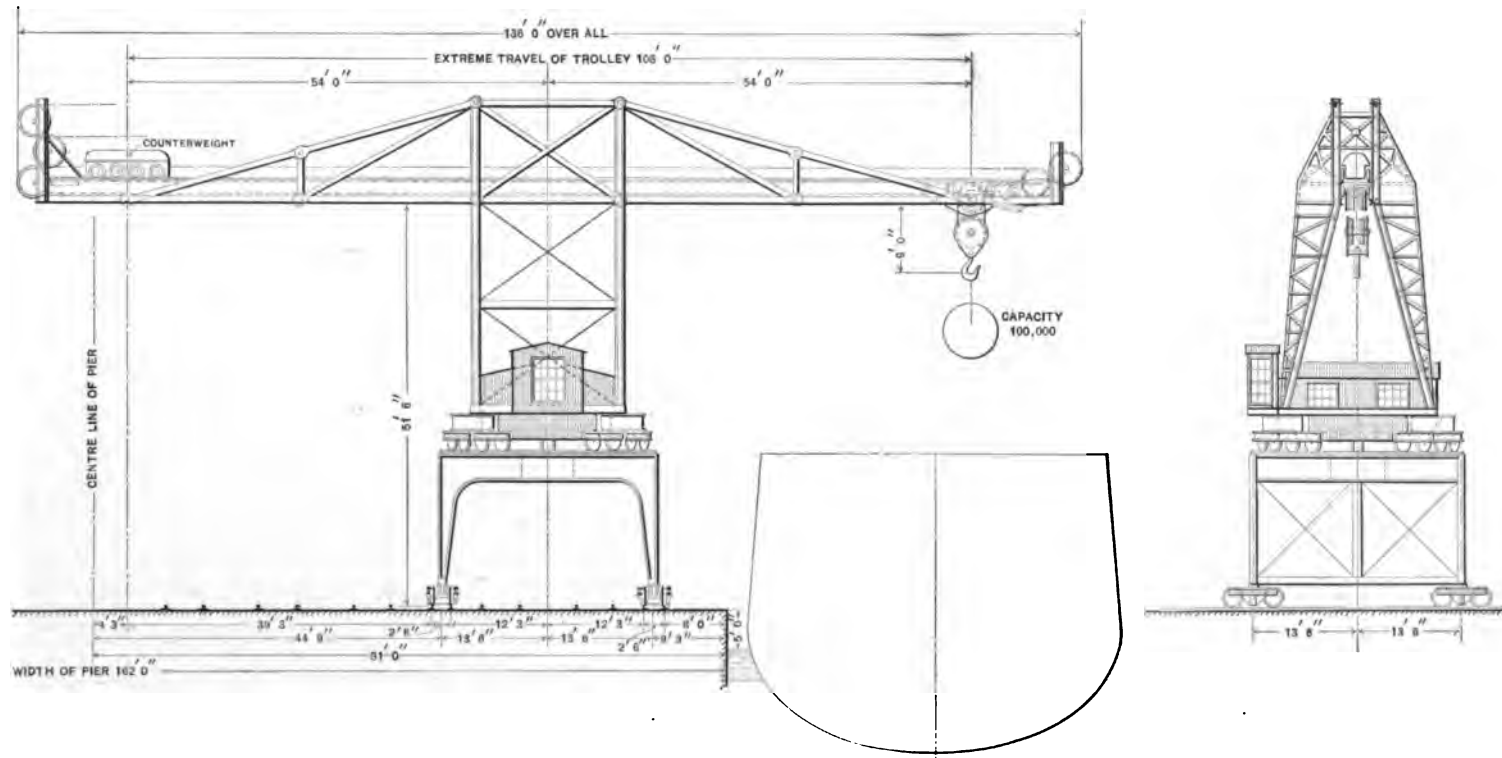
Hoisting, 50 to 150 feet per minute, depending upon the size of the load.

Trolley on overhead tramway, 500 feet per minute.

Crane along track, 200 feet per minute.

Rotating,  $1\frac{1}{2}$  revolutions per minute.

**SCALES.** This crane is equipped with scales in the trolley-track, so the operator can weigh any suspended load.



FIFTY-TON TRAVELING AND REVOLVING CANTILEVER CRANE. MOUNTED ON PORTAL PIER.

**ONE-HUNDRED-AND-FIFTY-TON CRANE.** This type of crane can be built up to 150 tons lifting capacity, and up to 100 to 150 feet radius, and in these large sizes has many new and desirable features not possessed by any jib or other type of locomotive crane, with none of the disadvantages of the latter. Full particulars will be furnished on application.



**"BROWNHOIST" 5-TON TRAVELING AND REVOLVING CANTILEVER CRANE.**  
NEWPORT NEWS SHIPBUILDING AND DRY DOCK COMPANY, Newport News, Virginia.



## PARTIAL LIST OF CANTILEVER CRANES IN OPERATION.

### UNITED STATES.

The William Cramp & Sons Ship and Engine Building Co., Philadelphia, Pennsylvania . . . . .	3	Cranes.
Newport News Shipbuilding and Dry Dock Co., Newport News, Virginia . . . . .	5	"
American Shipbuilding Co., South Chicago, Illinois (formerly Chicago Shipbuilding Co.) . . . . .	1	"
West Bay City, Michigan (formerly F. W. Wheeler & Co.) . . . . .	2	"
Chicago Drainage Canal, Chicago, Illinois . . . . .	11	"
Sharon Steel Co., Sharon, Pennsylvania . . . . .	3	"
Solvay Process Co., Detroit, Michigan . . . . .	1	"
Bethlehem Steel Co., South Bethlehem, Pennsylvania . . . . .	1	"
Punxsutawney Iron Co., Punxsutawney, Pennsylvania . . . . .	1	"
The Brown Hoisting Machinery Co., Cleveland, Ohio . . . . .	2	"
Jones & Laughlins, Limited, Pittsburg, Pennsylvania . . . . .	1	"
Dayton Coal and Iron Co., Dayton, Tennessee . . . . .	1	"
Lorain Steel Co., Lorain, Ohio . . . . .	2	"
United States Government, New York Navy Yard, Brooklyn, New York . . . . .	1	"

### GERMANY.

Aachener Huetten Actien Verein, Rothe Erde . . . . .	1	"
Eisen und Stahlwerk Hoesch Jetz Actien Gesellschaft, Dortmund . . . . .	1	"
Actien-Gesellschaft-Peiner Waltzwerk, Peine . . . . .	1	"

### LUXEMBURG.

La Société Anonyme des Hauts-Fourneaux de Differdange, Luxemburg . . . . .	1	"
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### BELGIUM.

La Société Anonyme d'Ougrée, Ougrée . . . . .	1	"
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### SWEDEN.

Witkowitz Bergbau, Lulea . . . . .	1	"
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### AUSTRIA.

Stabilmento Technico Triestino, Trieste . . . . .	1	"
Prager Eisen Industrie Gesellschaft, Teplitz . . . . .	1	"
Alpine Montangesellschaft, Donawitz . . . . .	1	"
Eisenerz . . . . .	1	"

### ENGLAND.

Vickers Sons & Maxim, Limited, Barrow-in-Furness . . . . .	4	"
Robert Stevenson & Co., Limited, Newcastle-on-Tyne . . . . .	2	"
Hebborn . . . . .	2	"
Harland & Wolff, Belfast, Ireland . . . . .	3	"
Nettlefolds, Limited, Nettlefolds, Wales . . . . .	1	"

## GANTRY CRANES.

**T**HE BROWN PATENT HIGH-SPEED GANTRY CRANES embody entirely new ideas in crane-construction, which construction makes practical longer spans and higher speeds than ever before attempted in this type of crane.

CONSTRUCTION. These cranes have their girders hung to the movable piers in such a way that if the tracks upon which they run get out of parallel or out of level, as frequently happens, or if, by reason of slippery rails or other causes, one end of the crane gets behind or ahead of the other, the crane can yet operate safely and satisfactorily, within reasonable limits.



“BROWNHOIST” GANTRY CRANE AT THE WORKS OF THE RITER CONLEY MANUFACTURING COMPANY, PITTSBURG, PENNSYLVANIA.

Heretofore it has been impossible to build Gantry Cranes of spans over ninety or one hundred feet, because, owing to their rigid construction, they would soon tear themselves to pieces.

In our Gantry Cranes there is no attempt to connect the bridge to the legs rigidly, the bridge being pivotally connected to a double-truck pier at one end, and suspended from a single shear or pier by means of a universal connection at the other.

**GIRDERS.** The girders, or bridge-trusses, are of our patent construction, designed to give the maximum strength with the smallest dead-weight and area of material, with the members of such shapes and so arranged in the trusses as to expose the least possible surface to wind-pressure. Owing to the exposed locations where these cranes are generally used, this question of wind-pressure is of the greatest importance, especially when high speeds are required.

**ENGINES.** One pair of engines (or motor), as in our other machinery, operating through friction-clutches, is all that is necessary to operate this type of crane in all its functions and at the high speeds for which the crane is designed.

**SPEEDS.** The speeds of our Gantry Cranes of five to ten tons capacity and of 200- to 250-foot spans are usually as follows:

Entire crane along runway, with full load, 300 to 900 feet per minute.

Trolley along girders, with full load, 500 to 1,200 feet per minute.

Hoisting full load, 100 to 300 feet per minute.

**USES.** Gantry Cranes make a perfect machine for handling material in beam and structural yards, unloading cars, etc., and in cases where a Cantilever Crane can not be used, they make a superior shipbuilding crane. They can be equipped with either one or two trolleys, with one high and one low leg, or with other modifications, as the illustrations herewith will show.

**GANTRY CRANE. PENNSYLVANIA STEEL COMPANY,  
STEELTON, PENNSYLVANIA.**

**T**HE PICTURES on this and the next page show a five-ton Electric Gantry Crane, 168-foot span, at the above works, designed and built for handling steel rails as they come from the rolls, to storage or cars.

**DESCRIPTION.** This crane has two lifting-trolleys running in unison on separate runways on the opposite sides of bridge, the two hooks always keeping the same position with reference to each other. This enables long rails to be lifted from two points without danger of twisting or swinging around.



GANTRY CRANE AT PENNSYLVANIA STEEL COMPANY. END VIEW.





**"BROWNHOIST" ELECTRIC GANTRY CRANE.**  
PENNSYLVANIA STEEL COMPANY, Steelton, Pennsylvania.

A special device for grabbing rails is attached to both hooks, and takes several rails at each load as they come from the rolls, putting same on storage-pile or cars, or will take them from storage-pile directly to cars.

**SPEEDS.**

Entire crane along the surface track, 400 feet per minute.

Trolley, full load, 1,000 feet per minute.

Hoisting, full load, 200 feet per minute.

**GANTRY CRANE. LORAIN STEEL COMPANY, JOHNSTOWN, PENNSYLVANIA.**

**O**N THE opposite page is shown a 6,000-pound-capacity steam Gantry Crane, of 187-foot span, handling switches, frogs, and special work at the laying-out yard of the above company's frog and switch works at Johnstown, Pennsylvania.

**DESCRIPTION.** This crane has a single trolley, and is of the typical "BROWNHOIST" construction as described under "Standard Bridge Tramways."

**SPEEDS.**

Hoisting full load, 300 feet per minute.

Trolley, full load, 1,000 feet per minute.

Bridge, full load, 900 feet per minute.

**GANTRY CRANE. AMERICAN SHIPBUILDING COMPANY, LORAIN, OHIO.**

**T**HERE ARE two Gantry Cranes at the above works, each driven by electricity. There are three longitudinal tracks, comprising two runways, upon which the entire crane travels, two tracks on a trestle on one side of the ship's berth, and one track on a trestle on the other side.

**DESCRIPTION.** The mechanism for traveling, hoisting, and trolleying is in the house carried on the pier of the double-track end of the crane.

Referring to the illustration on page 95, the clear span of this structure between supports is  $58\frac{1}{2}$  feet, and the cantilever extension 14 feet, making the total length of the bridge tramway on which the trolley travels  $72\frac{1}{2}$  feet. The working capacity of the crane is 14,000 pounds, and it will hoist this load at the rate of 30 feet per minute, and will travel the trolley across the bridge



**"BROWNHOIST" GANTRY CRANE.**  
LORAIN STEEL COMPANY, Johnstown, Pennsylvania.

with full load at 250 feet per minute, while the whole structure with full load can be traveled along the tracks at from 300 to 400 feet per minute.

A single electric motor is used for each crane, operating through friction-clutches as in the other machinery of this type described elsewhere. The operating-levers are arranged in the upper part of the house, and so located that one operator can control the different motions at one time if desired. This crane is so arranged that the span can be reduced by units of two feet by disconnecting the single pier and moving it, together with its supporting track, two feet nearer to the double pier. This is desirable in places where the ships are launched sideways, as is usual on the Great Lakes, and where the outer trestle is movable and used as a scaffold as well as a support for the crane.

#### HAND-POWER GANTRY CRANE. AMERICAN SHIPBUILDING COMPANY, CLEVELAND, OHIO.

**T**HIS CRANE, shown on page 96, is designed for a capacity of 3,000 pounds, with a span between supports adjustable from 46 to 53 feet. The tramway over which the whole crane travels can be of any required length.

**DESCRIPTION.** As shown in the picture, there are three longitudinal tracks along which the entire crane travels, the mechanism for hoisting being fixed on a platform carried on two tracks under one end of the bridge, and upon this platform the operators stand.

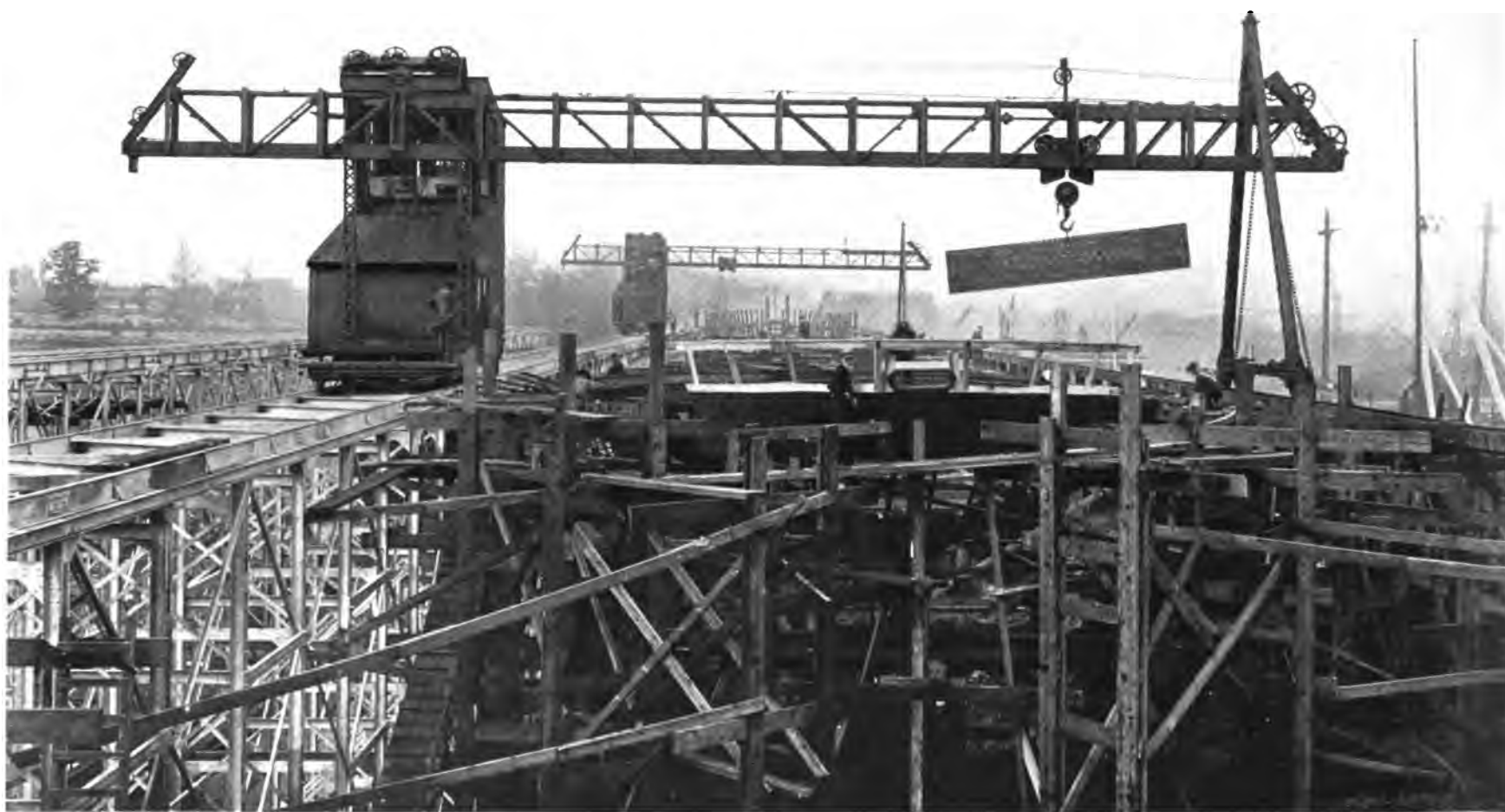
Steel-wire ropes are used throughout. Provision is made for the front shear-leg, running on a single track, to tip or tilt to accommodate itself to any changes in alignment of the track without increasing the friction or straining the crane. The whole crane may be run on a curved track.

**SPEEDS.** There are four speeds for hoisting, four for traveling across the bridge, and two for moving the load and crane along the tracks on which it is mounted.

Entire crane on longitudinal tracks, with load, 70 to 120 feet per minute.

Trolley across bridge, 100 to 200 feet per minute.

Two men lift 2,000 pounds 10 feet per minute.



**"BROWNHOIST" ELECTRIC GANTRY CRANE.**  
AMERICAN SHIPBUILDING COMPANY, Lorain, Ohio.



**"BROWNHOIST" HAND-POWER GANTRY CRANE.**  
AMERICAN SHIPBUILDING COMPANY, Cleveland, Ohio.



**"BROWNHOIST" GANTRY CRANE, WITH CANTILEVER EXTENSION.**  
AMERICAN SHIPBUILDING COMPANY, West Bay City, Michigan.

## PARTIAL LIST OF GANTRY CRANES IN OPERATION.

### UNITED STATES.

American Shipbuilding Co., Lorain, Ohio (formerly Cleveland Shipbuilding Co.) . . . . .	2	Cranes.
South Chicago, Illinois (formerly Chicago Shipbuilding Co.) . . . . .	1	"
Bay City, Michigan (formerly F. W. Wheeler & Co.) . . . . .	1	"
Lorain Steel Co., Johnstown, Pennsylvania . . . . .	1	"
Pennsylvania Steel Co., Steelton, Pennsylvania . . . . .	1	"

### AUSTRIA.

Witkowitz Bergbau, Moravia . . . . .	1	"
Prager Eisen Industrie Gesellschaft, Moravia . . . . .	1	"
Alpine Montangesellschaft, Vienna . . . . .	1	"

### SWEDEN.

Graham Bros., Göteborg . . . . .	1	"
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### CANADA.

Collingwood Shipbuilding Co., Collingwood, Ontario . . . . .	1	"
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## COAL- AND ORE-STORAGE AND REHANDLING PLANTS.

**O**UR STANDARD BRIDGE TRAMWAY is a perfect machine for storing and rehandling coal, ore, limestone, etc., at the blast-furnace, steel-works, colliery, etc. As we have elsewhere fully described the Bridge Tramway, we will here simply and Rehandling Plant Steel Company, Limited, Pittsburgh, Pennsylvania.

Referring to the following pages, there are Bridges, each independent, each having a cantilever extension of 33 feet. These four yard and are high of ore of 58 feet. The of each bridge rests on spanning a standard-with ample opening for a pass under same. The house are mounted opposite or single pier the top edge of a long with a short cantilever two railroad-tracks.



10-TON ELECTRIC MAN-TROLLEY ON STORAGE BRIDGE AT CARNEGIE STEEL CO., RANKIN, PA.

describe the Ore-storage built for the Carnegie Steel Company, Limited, Duquesne Furnace,

illustrations on the following four of our Standard independent and electrically clear span of 233 feet extension over railroad-tracks bridges span the storage-enough to make a pile back or machinery pier two rails on the ground, gauge railroad-track, locomotive and cars to motor and operators' above this track. The runs on a single rail on row of steel-ore bins, extension beyond over

Ore is brought to this furnace in large quantities during the season of navigation, and enough is stored to carry through the remainder of the year. The ore from the cars is dumped into the steel-bins, and from same is drawn into tubs of five tons capacity each, which are hoisted and conveyed to the ore-storage pile and there automatically dumped. The operator on each bridge controls

all the motions of the crane. These machines are propelled along the surface tracks by their own power. They may be moved directly opposite to any chute or bin from which the ore is being taken or is to be delivered.

For rehandling, the Brown Patent Shovel-bucket is used, as shown in the pictures below and on page 101. The operator manipulates this bucket with ease and rapidity, taking a five-ton load each time from the storage-pile, and dumping it in the bins or pockets under the cantilevers, whence it is drawn into the furnace-charging wagon and taken to the furnace-hoist. It will be seen that any ore can be put into any bin by these machines. Each bridge takes but one man to operate it, and will rehandle and put into bins 1,500 to 2,000 tons, or will store from 2,000 to 3,000 tons in ten hours.

Our Cantilever Cranes also are equally well adapted to the storage and rehandling of coal and ore, etc., and we herewith show several pictures of this type of crane.

#### STORAGE PLANT AT PROVIDENCE RUSSE.



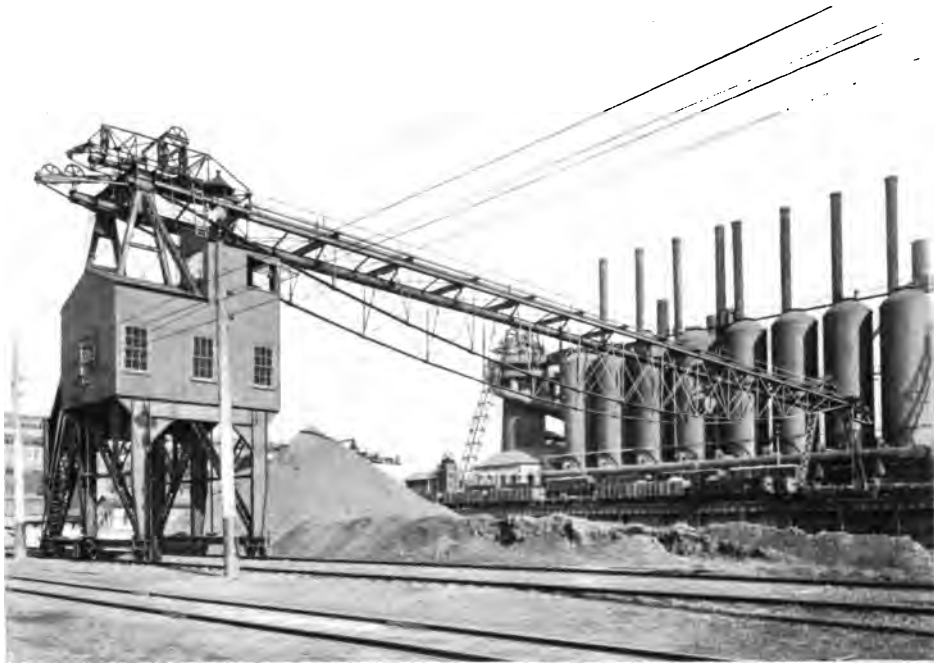
THIS PLANT, shown on page 102, at the furnace of the Providence Russe, Mariupol, Russia, consists of two Standard Bridges driven by electric motors, similar to the Carnegie machines described on the preceding page. These machines are storing and rehandling iron ore and limestone with great success, using our patent Shovel-buckets, as shown in the pictures.

#### STORAGE PLANT AT BETHLEHEM STEEL COMPANY.



SHOVEL-BUCKET SHOVELING ORE FROM END OF CANTILEVER CRANE.

ON PAGE 111 is shown a storage plant at South Bethlehem, Pennsylvania, at the works of the Bethlehem Steel Company, consisting of one of our Balanced Cantilever Cranes driven by steam, having 356-foot reach, traveling between two piles of coal, ore, and pig iron 58 feet high.



SHOVEL-BUCKET REHANDLING ORE.



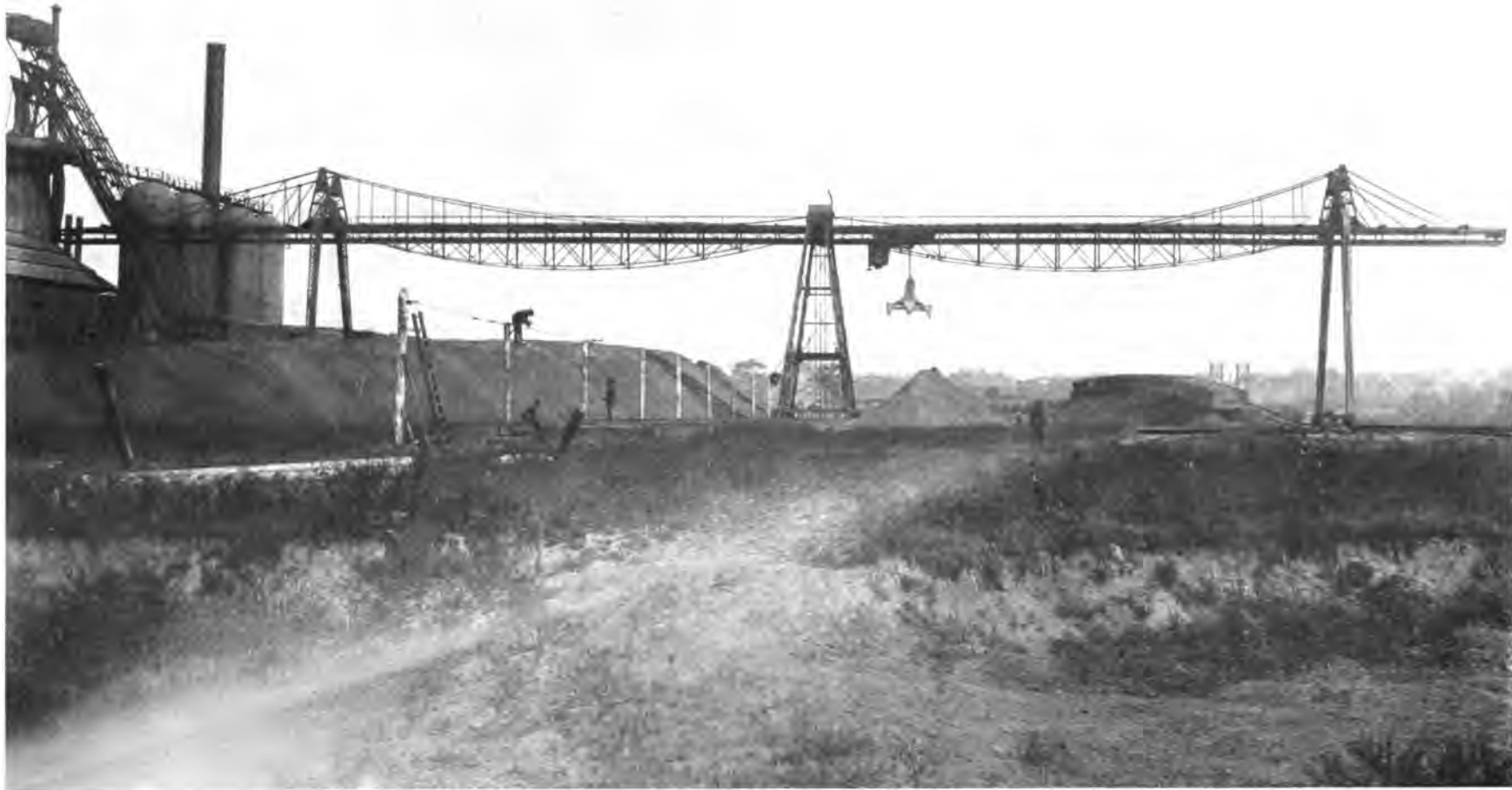
**"BROWNHOIST" ORE-STORAGE AND REHANDLING PLANT.**  
DUQUESNE FURNACES, CARNEGIE STEEL COMPANY, LIMITED, Pittsburg, Pennsylvania.



**"BROWNHOIST" STORAGE AND REHANDLING PLANT.**  
**PROVIDENCE RUSSE, Mariupol, Russia.**



**"BROWNHOIST" ORE-STORAGE AND REHANDLING PLANT.**  
DUQUESNE FURNACES, CARNEGIE STEEL COMPANY, LIMITED, Pittsburg, Pennsylvania.



**"BROWNHOIST" DOUBLE-BRIDGE TRAMWAY PLANT FOR STORING ORE.**

CLEVELAND FURNACE COMPANY, Cleveland, Ohio. Capacity in Bucket, 5 tons.

The coal and ore are brought to the works in cars and dumped in the hoppers shown in the picture, thence drawn into tubs, hoisted, conveyed, and dumped on the storage-piles. Several sizes and kinds of coal are handled, as well as several grades of ore, all of which are kept separate. All this material is rehandled with a shovel-bucket and loaded into cars for use around the works as wanted. Pig iron is also stored and rehandled by this machine, using an ordinary steel skip.

#### STORAGE PLANT AT PUNXSUTAWNEY IRON COMPANY.

**T**HIS PLANT, shown on page 112, is similar to the Bethlehem Steel Company's plant, inasmuch as a Balanced Cantilever Crane of the same size is used; but in this instance the crane revolves on a circular track instead of having longitudinal surface travel. This machine is operated by steam-power, and its operation is the same as that of the preceding machines described.

#### STORAGE PLANT AT CARRIE FURNACE, CARNEGIE STEEL COMPANY.

**T**HIS PLANT, shown on pages 106 and 107, consists of a storage area covered by two "BROWNHOIST" Bridge Tramway Machines, in connection with a "BROWNHOIST" Car-dumper, and a Transfer-tub Car system, for moving ore from Car-dumper to Bridges, all operated by electrical power.

The Car-dumper shown on page 107 has a capacity for cars up to 120,000 pounds, and is capable of dumping one car per minute. The ore is dumped into a hopper, from which it is drawn off into ten-ton capacity Transfer-tubs standing on Transfer-cars. Each car carries two tubs. There are two cars in each train controlled by one operator. The loaded tubs are moved from the Car-dumper to a point under one of the Bridge Tramway Machines and are then lifted and dumped into the storage-pile.

The two Bridge Tramway Machines travel longitudinally over two lines of steel ore-bins, and the ore is rehandled into these bins and is drawn out into electric larries (see page 152). The larries convey and dump the ore into the furnace-fillers beyond the row of bins.

The tub-handling cars, with tubs and method of loading them, are shown on page 108.



**ORE-STORAGE AND REHANDLING PLANT.**

CARNEGIE STEEL COMPANY, CARRIE FURNACES Nos. 1 and 2, Rankin, Pennsylvania. Two bridges, each 558 feet long, moving load 20 tons. Load on hook, 14 tons.





**"BROWNHOIST" ORE-STORAGE AND REHANDLING PLANT.**

CARNEGIE STEEL COMPANY, CARRIE FURNACE, Rankin, Pennsylvania.

Electric car-dumper (capacity, cars up to 120,000 pounds) for dumping ore into transfer-tubs. Tubs are shown under dumper.



FIGURE 1.

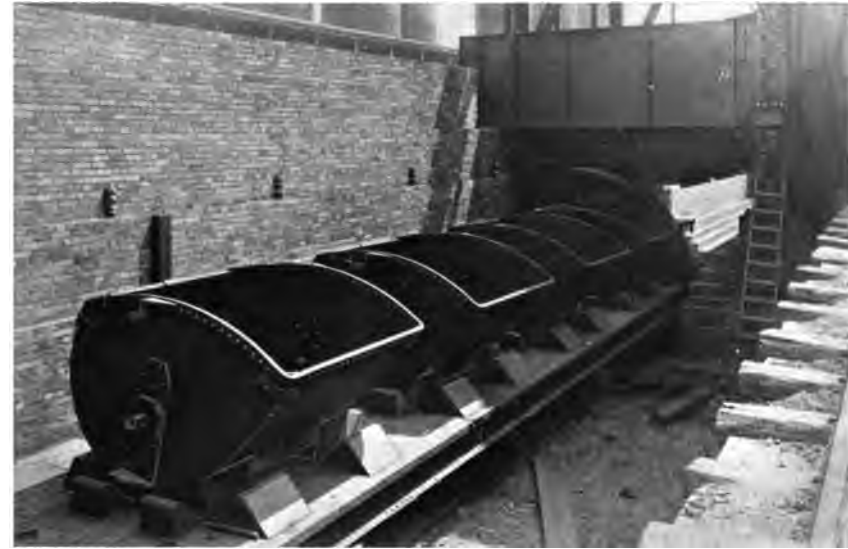


FIGURE 2.



FIGURE 3.



FIGURE 4.

# **"BROWNHOIST" ORE-STORAGE AND REHANDLING PLANT.**

CARNEGIE STEEL COMPANY, CARRIE FURNACE, Rankin, Pennsylvania.

Electric transfer-cars and -tubs for the transfer of ore from car-dumper shown on page 107, to Storage-bridge, shown on page 106. Figure 1. Shows valve mechanism, etc., used in filling tubs under car-dumper. Figure 3. Loaded cars under bridge, shown on page 107. Figure 2. Empty tubs moving hopper of car-dumper. Figure 4. Tubs being filled under car-dumper.



**"BROWNHOIST" ORE-STORAGE AND REHANDLING PLANT, WITH CAR-DUMPER AND TRANSFER-TUB CARS.**  
**CRUCIBLE STEEL COMPANY, Clairton, Pennsylvania.**



**"BROWNHOIST" COAL-STORAGE AND REHANDLING PLANT, 50,000 TONS STORAGE CAPACITY.**

NEW YORK CENTRAL & HUDSON RIVER RAILROAD, West Albany, New York.

In this plant the bridge rotates around a circular pit into which the coal is dumped from cars and from which the coal is taken by grab-bucket to the storage-pile.



**"BROWNHOIST" STORAGE AND REHANDLING PLANT.**  
BETHLEHEM STEEL COMPANY, South Bethlehem, Pennsylvania.



**"BROWNHOIST" STORAGE AND REHANDLING PLANT.**  
PUNXSUTAWNEY IRON COMPANY, Punxsutawney, Pennsylvania.





**"BROWNHOIST" ORE-STORAGE AND REHANDLING PLANT.**

AMERICAN STEEL HOOP COMPANY, Etna, Pennsylvania.





**"BROWNHOIST" ORE-STORAGE AND REHANDLING PLANT, WITH CAR-DUMPER AND TRANSFER-CAR SYSTEM.**

CARNEGIE STEEL COMPANY FURNACES, Nos. 3 & 4, Rankin, Pennsylvania. Man-trolley; capacity in bucket, 10 tons.



**"BROWNHOIST" COAL-STORAGE AND REHANDLING PLANT.**  
EDISON ELECTRIC ILLUMINATING COMPANY, Boston, Massachusetts. Man-trolley, with 84-cubic-foot Grab-bucket.

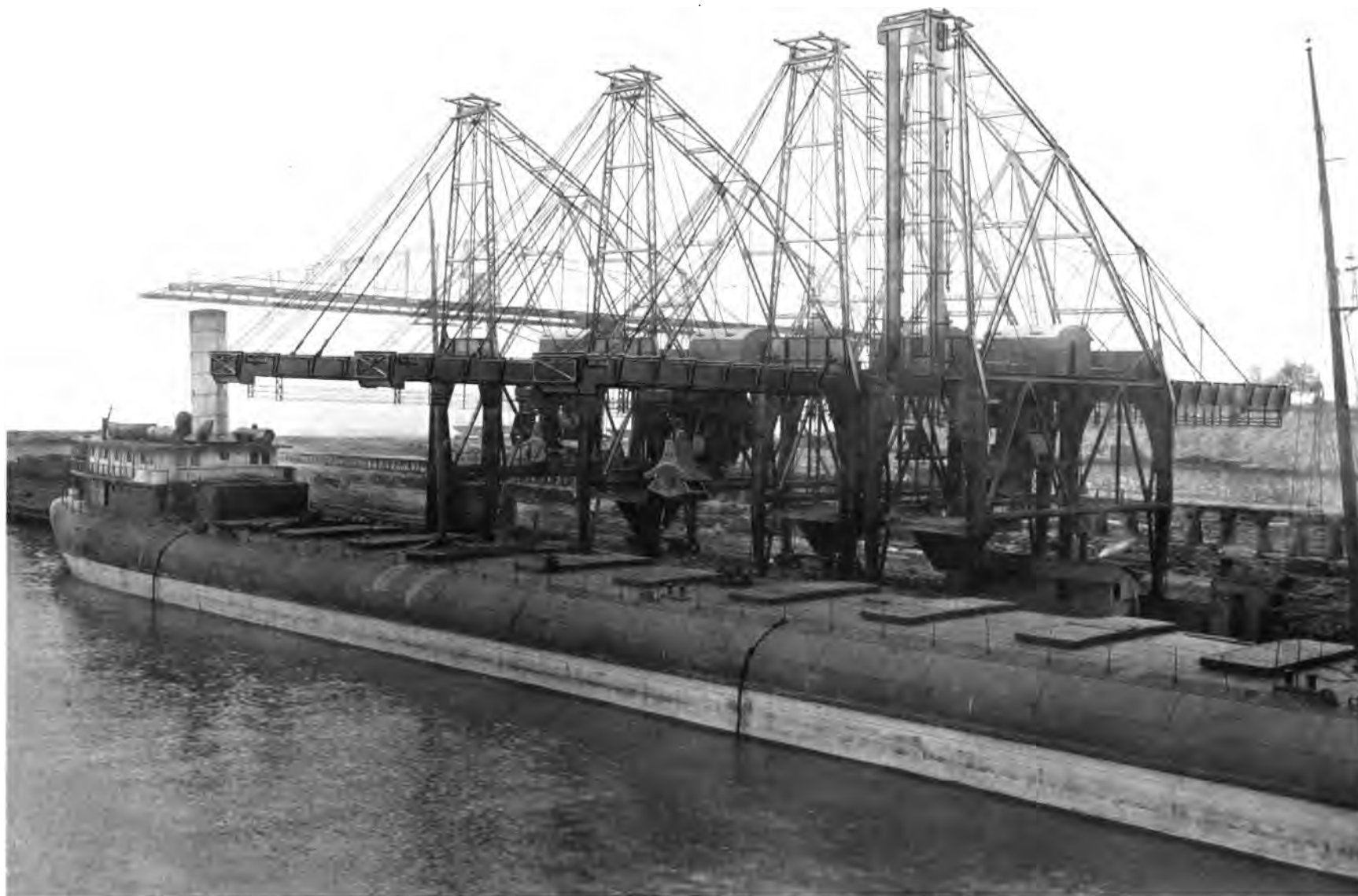


"BROWNHOIST" COAL-STORAGE AND REHANDLING PLANT.  
COXE BROTHERS & COMPANY, Roan, Pennsylvania.





**"BROWNHOIST" STORAGE AND REHANDLING PLANT.**  
CAMBRIA STEEL COMPANY, Johnstown, Pennsylvania.



**FOUR "BROWNHOIST" ELECTRIC "FAST PLANT" UNLOADERS.**  
Each with Man-trolley operating an 80-cubic-foot Brown Ore Grab-bucket. Showing Storage-bridge (see also opposite page) in rear.  
**PITTSBURG & CONNEAUT DOCK COMPANY, Conneaut, Ohio.**



**"BROWNHIST" ELECTRIC BRIDGE TRAMWAY STORAGE AND REHANDLING PLANT AT CONNEAUT, OHIO.**  
PITTSBURG & CONNEAUT DOCK COMPANY, UNITED STATES STEEL COMPANY.  
Man-trolley, with 7-ton Brown Ore Grab-bucket.

## PARTIAL LIST OF PLANTS FOR STORING AND REHANDLING ORE, ETC.

### UNITED STATES.

Carnegie Steel Co., Limited, Duquesne Furnace, Pittsburg, Pennsylvania, one plant of four bridges, driven by electricity.  
Carnegie Steel Co., Limited, Carrie Furnace, Pittsburg, Pennsylvania, one plant of three bridges, with car-dumper, driven by electricity.  
Bethlehem Steel Co., South Bethlehem, Pennsylvania, one plant of one cantilever, driven by steam.  
Cambria Steel Co., Johnstown, Pennsylvania, one plant of two bridges, driven by steam.  
Punxsutawney Iron and Steel Co., Punxsutawney, Pennsylvania, one plant of one cantilever, driven by steam.  
Buffalo & Susquehanna Iron Co., Buffalo, New York, one plant of three bridges, driven by electricity.  
Crucible Steel Co., Blair Station, Pennsylvania, two bridges, electric.  
Milwaukee Gas Light Co., Milwaukee, Wisconsin, one bridge storing coke and one bridge storing coal.  
Edison Electric Illuminating Co., Boston, Massachusetts, one bridge storing coal, electric.  
Cleveland Furnace Co., Cleveland, Ohio, one bridge storing ore, electric.  
Pittsburg & Conneaut Dock Co., Conneaut, Ohio, one bridge storing ore, electric.  
Coxe Bros. & Co., Roan, Pennsylvania, one plant of one bridge, for storing coal, driven by steam.  
New York Central & Hudson River Railroad, West Albany, New York, one bridge for handling coal, electric.

### CANADA.

Dominion Iron and Steel Co., Sydney, Cape Breton, one plant of three bridges, driven by steam.

### RUSSIA.

Providence Russe, Mariupol, one plant of two bridges, driven by electricity.



## SHED TRAMWAY COAL-STORAGE PLANT.

THE "BROWNHOIST" SHED TRAMWAY PLANT is especially designed for handling coal from vessels, cars, etc., and stocking same under roofs or sheds.

DESCRIPTION. The overhead runways on which the trolleys travel from the rear end of the building to vessel at dock-front are movable from side to side (at right angles to the longitudinal line of travel of the trolleys), as the upper supports of these runways are hung from wheels, which move on tracks suspended from the roof-trusses, thus enabling every portion of the storage-space to be reached, and enabling the overhead tramways to move to any position along the front of the dock or in the sheds, to suit the hatch of the vessel or stock-pile. This system surpasses all others in completeness.

ADVANTAGES. The first cost of the building is less than the old way ; the entire space is free from posts, trestle-track, and other timber obstructions ; the roof is not cut up by hatches and chutes ; the coal is never dumped more than two or three feet, thereby saving in breakage, and can be taken from any stock-pile in the building and carried to any other part, or loaded into cars, wagons, or vessels, as desired.

## PARTIAL LIST OF USERS OF SHED TRAMWAY PLANTS.

### UNITED STATES.

Coxe Bros. & Co., Chicago, Illinois.

Coxe Bros. & Co., Milwaukee, Wisconsin.

Philadelphia & Reading Coal and Iron Co., Cheektowaga, New York. (Destroyed by fire.)

Philadelphia & Reading Coal and Iron Co., Milwaukee, Wisconsin.

Worcester Gas Light Co., Worcester, Massachusetts.

Lowell Gas and Electric Co., Lowell, Massachusetts.

### AUSTRIA.

Alpine Montangesellschaft, Vienna.



**"BROWNHOIST" COAL-STORAGE PLANT. UNLOADING-TOWERS.**  
COXE BROTHERS & COMPANY, Chicago, Illinois. Showing aprons in vertical position.

## CAR-DUMPING MACHINE.

**D**URING THE past few years several types of car-dumping machines for transferring coal (for water shipment) from cars to vessels have been put in successful operation in America, but the designers of these machines have not given much attention to the all-important question of breakage of the coal.

The Brown Hoisting Machinery Company studied the car-dumping machine question carefully, and determined to produce a machine that would effect the following results :

1. Handle the coal without breakage.
2. Keep the vessel on even bilge and keel while loading.
3. Put the entire cargo aboard without moving the vessel.
4. Load the vessel rapidly and economically.
5. Handle the loaded and empty cars to and from the machine, doing away with a locomotive and train-crew.

No other machine has been produced that embodies all of these features, while our machine accomplishes them perfectly.

**MAIN FEATURES.** The conspicuous elements of our Car-dumping Machines are :

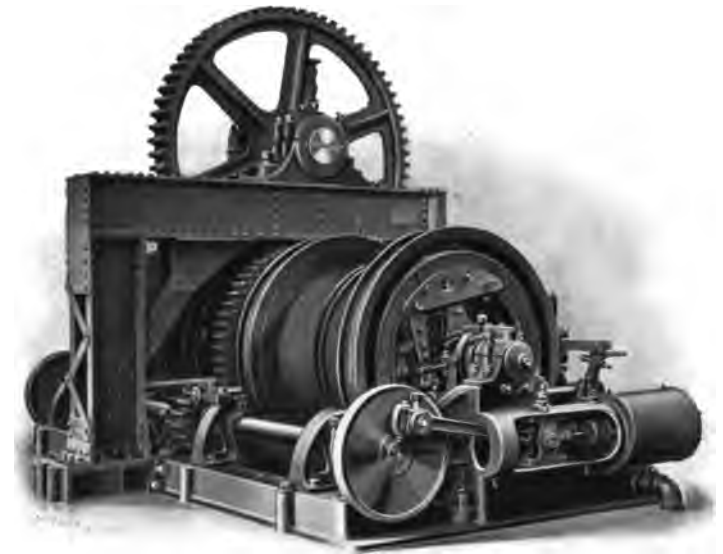
The Car-tipping Device, or Cradle, into which the car is run and then clamped, which then turns over with the car and discharges its contents.

The Transfer-tubs and Tub-cars, into which the coal is dumped from the car in the Cradle.

The Overhead Traveling Cranes, which take the tubs from the tub-handling cars and lower them into the hold of the vessel.

The Car-pushing Device and system of tracks by which the loaded and empty cars are put into and taken out of the machine.

**OPERATION.** When the Cradle is in its lowest position, as shown in the picture on page 130, a loaded car of coal is pushed



TYPE OF ENGINE USED ON CAR-DUMPING MACHINE.

into same by the operator with the Car-pushing Device, or "Ground-hog" (commonly called because it rests in a pit between the tracks when not in use, so that the cars can pass over it). Once in the Cradle, which will take any size gondola- or hopper-car, from the largest to the smallest, the car is quickly clamped on the top and sides with hydraulic clamping-bars, and the engines set in motion, slowly turning the Cradle over until the car is upside down, wheels in the air, as shown in the picture on page 131.

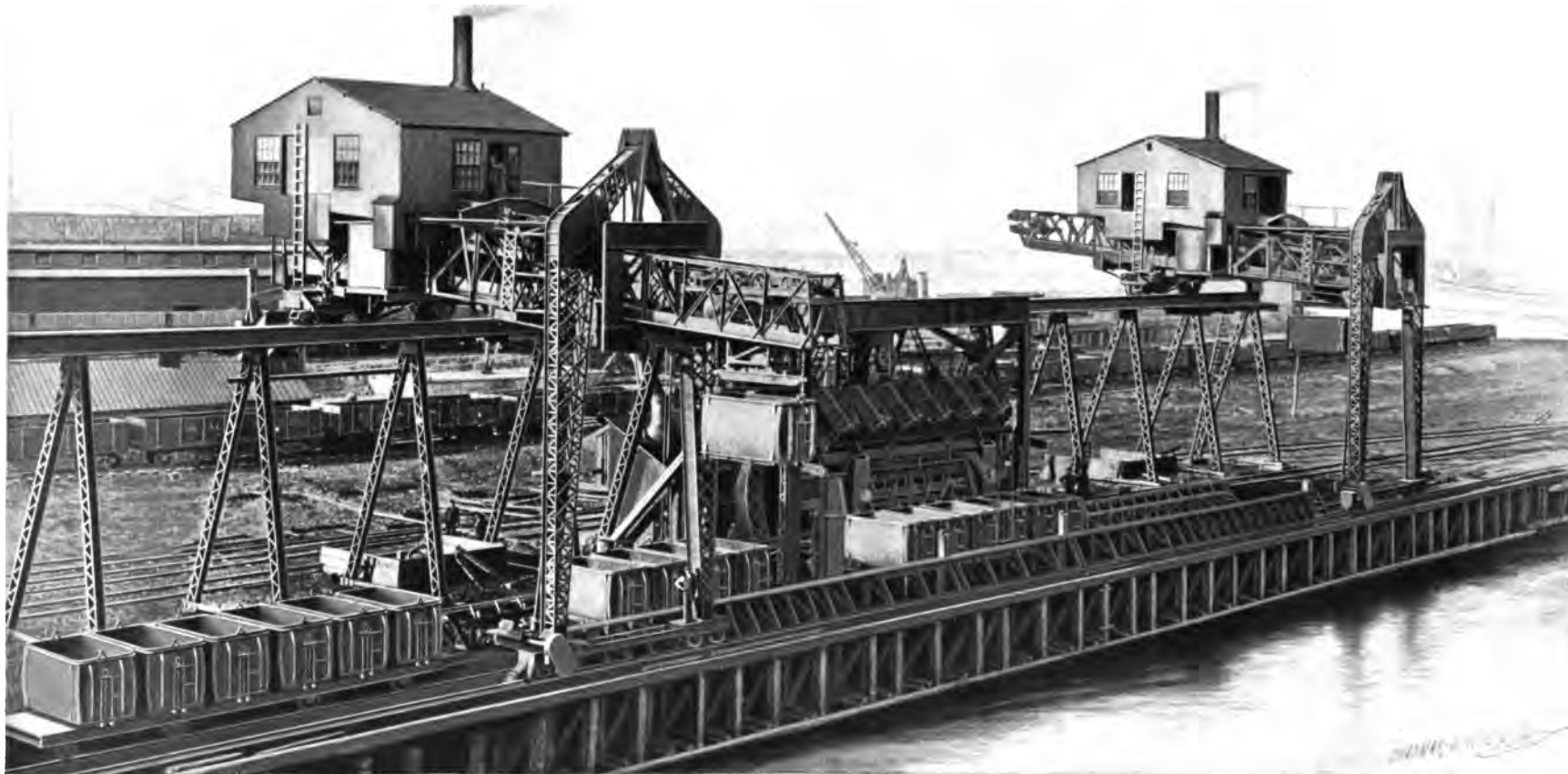
During the process of overturning the car, the coal has rolled, not fallen, from the car into six hopper-compartments attached to the Cradle, and these six hoppers have each of them entered a Transfer-tub, also shown in the picture. These hopper-compartments have doors which bottom of the Transfer-tubs. Therefore, position the car of coal is left in these carefully placed, not having been dropped to put the coal in these oblong tubs so the vessels. When the Cradle has returned pushed out by the next loaded car coming then the loaded car is clamped in place time, however, the tub-handling car containing operator from in front of the hoppers, and a



"GROUND-HOG."

**OVERHEAD CRANES.** Two the machine at a speed of 600 feet per masts of vessels) which work independently tubs, one at a time, from the tub-handling hold, where, after touching the ship's bottom or the top of the coal-pile, the doors are released and the coal gently rolls out as the tub is pulled away. The crane-operator then returns the empty tub to its proper position on the tub-handling car, taking the next filled tub and dumping it in the same manner. When all the tubs on this car are emptied it is returned to the hoppers for another load. The crane-operator can dump the tubs in the center of the hatch or at either side of same, and can distribute the coal to all hatches, and by this distribution of the coal it is possible to keep the vessel trimmed at all times and to keep the boat on an even keel.

**CAPACITY.** Two overhead cranes are ample to handle 5,000 tons in ten hours, and the tipping-device is able to



**"BROWNHOIST" CAR-DUMPING MACHINE. GENERAL VIEW.**  
The nearest crane has ram extended, with tub suspended. The farthest crane has ram run back.

handle twice as much. Therefore, with the simple addition of two extra overhead cranes, one car-dumper would have a capacity of 10,000 tons in ten hours.

The attached copy of letter, bearing on this subject, explains itself.

HOCKING VALLEY RAILROAD.

COLUMBUS, Ohio, July 24, 1903.

THE BROWN HOISTING MACHINERY COMPANY,  
Cleveland, Ohio.

Dear Sirs: For your information, beg to advise that on 17th instant we loaded with one of our Brown Coal-machines aboard the steamer "MACWILLIAMS," 4,500 tons of coal in nine hours, being an average of 500 tons per hour, or one car every four minutes, averaging the capacity of cars at 33 tons, which is about right. We regard it as among the possibilities to do as well as this on boats of similar capacity one day with another.

Yours truly,

M. S. CONNORS.

HOCKING VALLEY RAILROAD.

COLUMBUS, Ohio, July 28, 1903.

THE BROWN HOISTING MACHINERY COMPANY,  
Cleveland, Ohio.

Gentlemen: Your favor of the 27th instant to hand.

Since writing you, our dock made another record, which places the one reported to you in my letter of 24th in the background, which record I give you for your information.

On July 27, No. 3 Machine loaded aboard the steamer "BRAWN" 5,245 tons in eight hours and forty-five minutes, being approximately 600 tons per hour, or about  $3\frac{1}{3}$  minutes per car.

If we get anything better than this, I will write you again.

Yours truly,

(Signed) M. S. CONNORS.

HOCKING VALLEY RAILROAD.

COLUMBUS, Ohio, August 1, 1903.

THE BROWN HOISTING MACHINERY COMPANY,  
Cleveland, Ohio.

Gentlemen: There seems to be no limit to our ability to break loading records with Brown Hoisting Machines.

The latest record for loading with us was accomplished with Brown Machine on T. & O. C. dock on July 29, when 102 cars, 3,468 tons of



**"BROWNHOIST" CAR-DUMPING MACHINE. SIDE VIEW.**

Showing car placed in cradle, and tub being lowered into vessel.





CAR BEING PUSHED INTO CRADLE, AND TUB OVER VESSEL



SHOWING TUBS AND HOPPERS.



SAME, WITH CRANE HOISTING A FILLED TUB.



CAR BEING DUMPED.

**"BROWNHOIST" CAR-DUMPING MACHINE.**

For dumping and transferring coal without breakage.

coal, were loaded aboard the steamer "APPOMATOX" in  $5\frac{1}{2}$  hours, or one car every 3.23 minutes, which is a loading average of 630 tons per hour.

Do you know of a better record elsewhere?

Yours truly,

M. S. CONNORS,  
General Superintendent.

HOCKING VALLEY RAILWAY COMPANY.

THE BROWN HOISTING MACHINERY COMPANY,  
Cleveland, Ohio.

COLUMBUS, Ohio, August 12, 1904.

Gentlemen: Here is the latest and best loading record that has been made by the three coal-handling machines on Hocking Valley and T. & O. C. docks, Toledo: 728 cars, 25,146 tons, during the 24 hours ending 6 A. M. to-day. This, you understand, represents 22 working-hours.

Yours truly,

M. S. CONNORS.

MORE ABOUT NON-BREAKAGE OF COAL. As the coal does not "fall" at any stage of the operation, little or no breakage is the result; and a consequent feature of the operation, which affords satisfaction to the vessel's crew especially, is the entire absence of coal-dust. As a result of the non-breakage of coal, it is worth from ten to twenty-five cents per ton more after reaching destination than it otherwise would be.

We add the following correspondence on this point, which is self-explanatory, and would say that numerous orders and contracts for coal placed by private concerns on the Lakes specify distinctly that the coal is to be loaded by the "BROWNHIST" Machine, simply because it does not break the coal.

NORTHWESTERN FUEL COMPANY.

Messrs. A. C. SAUNDERS & COMPANY,  
Cleveland, Ohio.

April 28, 1897.

Gentlemen: I beg to enclose you herewith letter received from our Green Bay agent touching the question of the way the Hocking coal looked that came out of the "SIBLEY," handled over the Brown Machine. If that is the way these machines are going to work, I hope we will be able to get all of our Hocking coal loaded with them, even if it is going to take a little longer.

Yours very truly,

(Signed) R. N. SAUNDERS,  
President Northwestern Fuel Company.

NORTHWESTERN FUEL COMPANY.

Mr. E. L. BOOTH,  
Third Vice-President,  
St. Paul, Minnesota.

GREEN BAY, Wisconsin, April 26, 1897.

Dear Sir: Replying to your favor of the 23d regarding the condition of the coal in the "SIBLEY," her cargo is the best we have ever had in the way of lumpy Hocking coal. Before your letter came, Mr. Seims reported that it would take longer to unload the "SIBLEY" than it used to other boats, for the reason of the coal being so lumpy; and yesterday I went to the docks to see the coal, and it is certainly a fine-looking shipment. We should have no difficulty in sending out well-sized cars with this cargo to draw from. I hope all the Hocking coal which comes for us will be as good as this.

Yours very truly,

NORTHWESTERN FUEL COMPANY,  
(Signed) M. J. McCORMICK, Agent.

STEAMER "HENRY J. JOHNSON."

TO WHOM IT MAY CONCERN:

CLEVELAND, Ohio, May 13, 1897.

Having taken cargo and fuel from the Brown Rapid Coal-handling Plant on the C. & P. Dock, Whiskey Island, this city, I cheerfully subscribe to the following statement, as indicating my opinion of the machine and its operations:

It is the best coal-loading machine on the Lakes, because it puts the coal in the hold without breakage, thus giving more tonnage, for the same room, over machines in which the coal is much broken. It is clean in its operation, scarcely causing dust. It loads the boat in one final position on a perfectly even keel, and without the annoyance of moving each hatch under the machine in succession. I am very much pleased with the plant's operation, and believe, when the operators become more expert and the newness has worn off, it will give satisfaction in speed, non-breakage of coal, safety, and increased tonnage for hold-room.

Yours truly,

(Signed) Capt. CHARLES MINER,  
Str. "Henry J. Johnson."

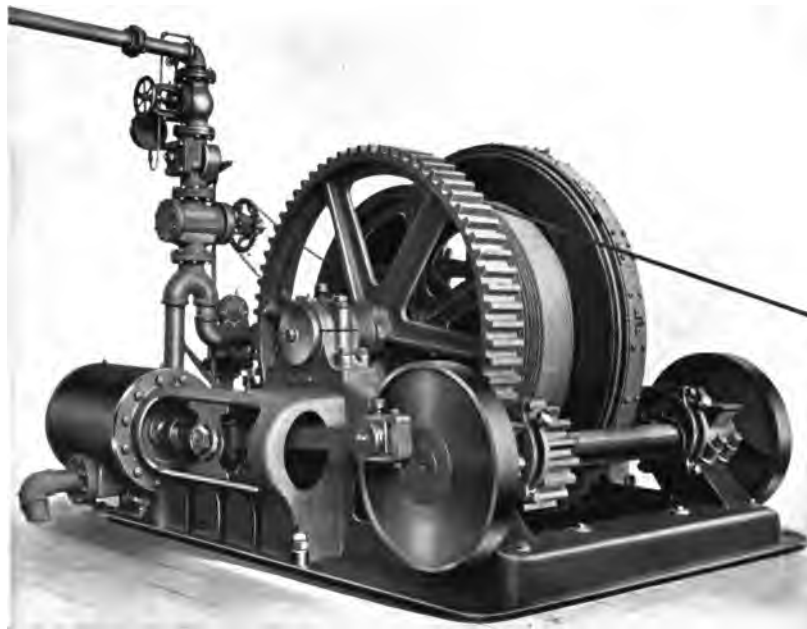
PARTIAL LIST OF CAR-DUMPING MACHINES IN OPERATION.

UNITED STATES.

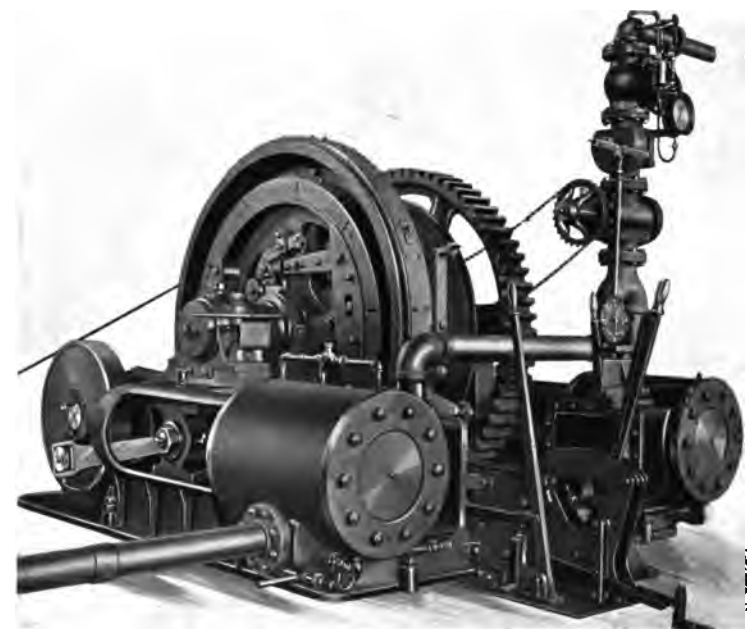
Columbus, Hocking Valley & Toledo Railroad, Toledo, Ohio, two machines operated by steam.  
Toledo & Ohio Central Railroad, Toledo, Ohio, one machine operated by steam.  
Carnegie Steel Co., Limited, Pittsburg, Pennsylvania, two machines for handling ore, operated by electricity.  
Sharon Steel Co., Sharon, Pennsylvania, one machine handling ore, operated by electricity.  
Solvay Process Co., Detroit, one machine handling coal, operated by steam.  
Hecla Portland Cement Co., Bay City, Wisconsin.  
Crucible Steel Co., Clairton, Pennsylvania, one machine operated by electricity.

## THE BROWN PATENT FURNACE-HOIST AND THE BROWN PATENT STOCK-DISTRIBUTOR.

**T**HE BROWN FURNACE-HOIST, invented and patented by Mr. Fayette Brown, is an apparatus for the automatic charging of blast-furnaces and kilns, which dispenses with the employment of top-fillers, all operations being conducted by one man located at the engine at base of hoist.



FRONT VIEW.



REAR VIEW.

TYPE OF ENGINE USED WITH FURNACE-HOIST.

THE BROWN STOCK-DISTRIBUTOR and automatic charging-device, patented by Mr. Alexander E. Brown, is an apparatus used in connection with the Brown Furnace-hoist, to absolutely insure any desired, predetermined order of distribution of stock in the furnace.

**REMOVING PLATFORM AND CRANE.** A platform (AA) built out to one side of the furnace, is also supported by the upper framework. The cage and hopper can be run out on this platform, out of the way, while the bell is being removed. There is also in the upper part of this framework a small crane (M), which is used in placing the large sheave at the top of the furnace as well as the other mechanism for rotating the distributor. Suitable ladders and platforms are provided, so that all sheaves and other parts of the mechanism are easily accessible at all times.

#### **BELL AND HOPPER.**

to be of the usual form and construction. In a new furnace we prefer to use a double bell-rod, as this facilitates the removal of the cage and distributor. In an old furnace where necessitate considerable change in bell-rod can be used if desired. In for removing the cage and distributor. With a double bell-rod the inner free from obstruction, which is an material is to be fed into the furnace. to remove the cone and distributor

**CAGE.** Resting on top of cone-shaped cage (D-D') built up a support for the distributing provided with a large number of so arranged as to give easy access over the bell. There is a removable, which, by being unbolted, allows the cage to pass by the bell-rods while being removed.

**CASTERS.** The cage is provided with four heavy casters, or rollers, which run on the rails on top of the removing platform. Whenever the cage is to be run out on the platform it is first raised (by means of tackle attached to the framework overhead or by jacks) to a sufficient height to allow short sections of rails to be placed underneath the casters. The cage is then lowered down to these rails and is then easily run out on the platform.



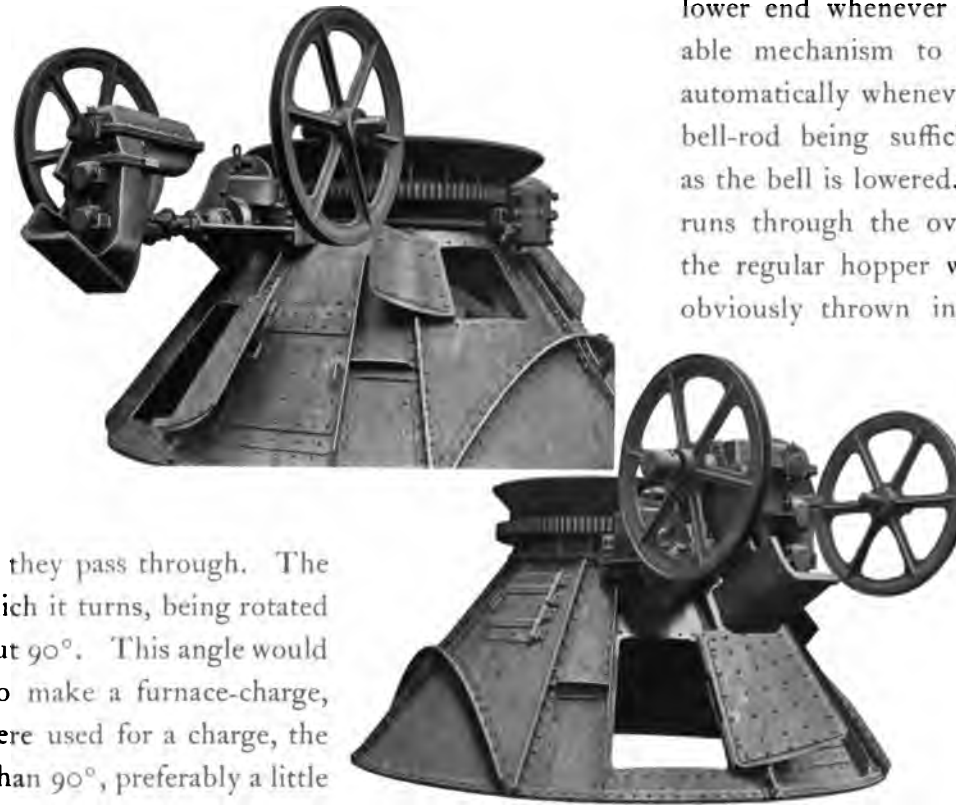
ROTATING STOCK-DISTRIBUTOR.

The bell and hopper (AB and AD) are tion. In a new furnace we prefer to tates the removal of the cage and dis- the use of this double rod would the hopper and its supports, a single this case special provision is made tributing-hopper past the bell-rod. surface of the distributor is entirely important point if scrap or large

In either arrangement it is possible with very little time and labor. the usual cast-iron hopper is a of steel plates, which furnishes device proper. This cone is explosion-doors (G), which are to any part of the interior space able section (D) at each side,

**DISTRIBUTING DEVICE.** The distributing-hopper (C) is made of cast iron, very heavy and strong, to allow for wear and to prevent it being distorted by the heat of the furnace. The distributor is provided with a door (Y), which closes the opening at the being connected with suit-way that it is operated of a few inches in the prevents the escape of gas into the conical hopper, it thrown into that portion of ing. The next skip-load is distributor is set, for in-revolution in four trips, thrown into a separate per. The distributor-mouth as to afford the best possible to be thoroughly mixed as they pass through. The horizontal surface, upon which it turns, being rotated car through an angle of about  $90^{\circ}$ . This angle would skip-loads which are used to make a furnace-charge, is desired. If four loads were used for a charge, the a little more, or a little less, than  $90^{\circ}$ , preferably a little successive revolutions of the hopper would deposit on the bell, thus producing perfect distribution.

**ROTATING MECHANISM.** Suitable the hopper with the large sheave (AG) at the top of the furnace, around which the rope from the skip-car passes. In this mechanism there is a ratchet-and-pawl device, which is so arranged that as the loaded car goes up the furnace this ratchet simply slips by and does not rotate the mechanism, but as the empty car comes down from the top of the furnace, the ratchet



**STOCK-DISTRIBUTOR AND CAGE.**  
As arranged for double skip, showing rotating mechanism.

lower end whenever the bell is lowered; this door able mechanism to the bell-rods, and in such a automatically whenever the bell is lowered, a motion bell-rod being sufficient to close the door, which as the bell is lowered. When a skip-load is dumped runs through the oval spout at the bottom and is the regular hopper which is in front of the open-obviously thrown into a new position, and if the stance, to make an entire each skip-load would be quarter of the regular hop-is designed of such a shape opportunity for the materials distributor rests on a flat, with each return trip of the depend upon the number of and can be made whatever angle of rotation would be more. By this arrangement, the loads at different places

mechanism (AF) connects



**THE BROWN PATENT FURNACE-HOIST.**  
LA BELLE IRON WORKS, Steubenville, Ohio.



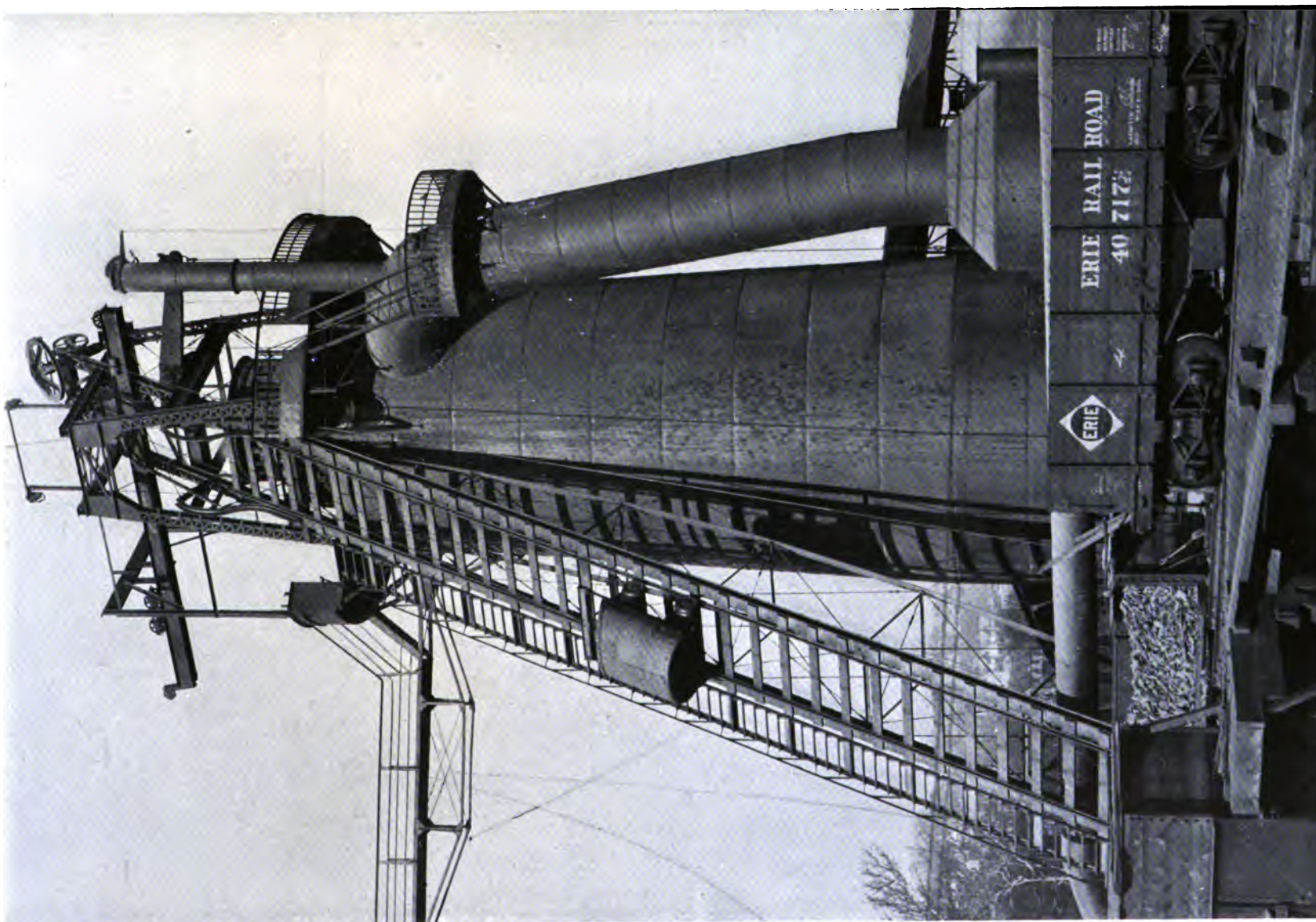


SKIP-CAR AT TOP OF INCLINE.



SKIP-CAR DUMPING INTO DISTRIBUTOR.

**THE BROWN PATENT FURNACE-HOIST AND STOCK-DISTRIBUTOR.**



**THE BROWN PATENT FURNACE-HOIST.**  
View of stack, showing arrangement of bridge, etc.

and pawl engage, the mechanism is driven, and the distributor is rotated through the desired angle. The gears and mechanism driving the distributor are enclosed in an oil-tight casing in such a manner that this mechanism can be rotated constantly in an oil-bath and at the same time permit of

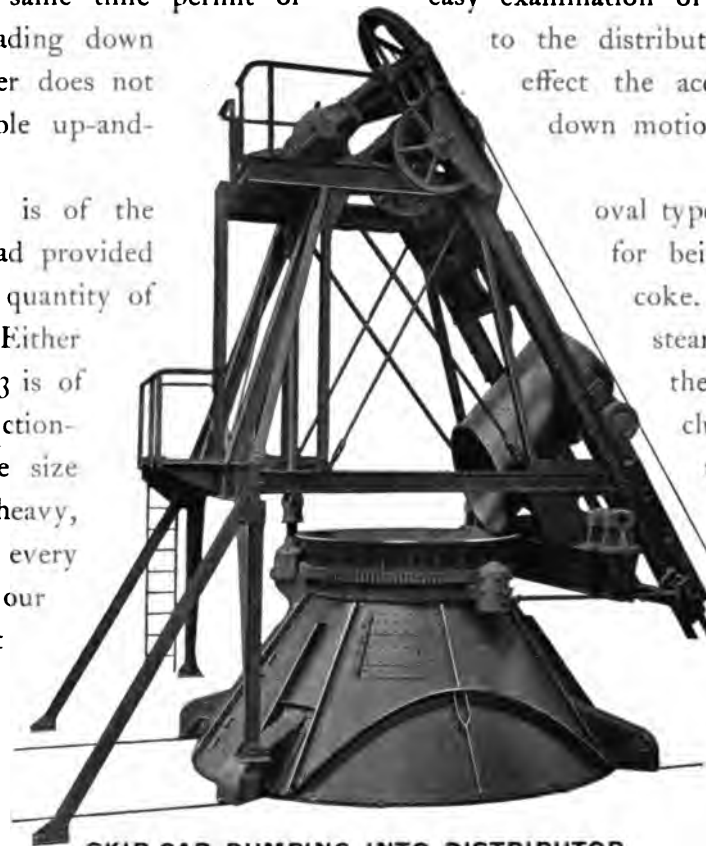
easy examination of all parts. Suitable appliances are placed on the vertical shaft (AH) leading down to the distributor, by means of which any slight effect the accurate working of the mechanism. down motion of the furnace, without the mechanism being effected.

**SKIP-CAR.** The skip-car (F) is of the made for any desired capacity, the load provided ore and limestone, or a proportionate quantity of

**ENGINE OR MOTOR.** Either desired. The engine shown on page 133 is of It is provided with a Brown Patent Friction-diameter, and a winding-drum of ample size in one wrap. The engine is extra heavy, of work, and is carefully constructed in every

**AUTOMATIC STOP.** With our is a special feature. It is the simplest constructed for this purpose. If either lighter load of coke is being taken motion of the car is controlled per-brought to rest with absolute certainty reaches the top. On our steam-device is attached to the engine in skip-car reaches the top of the furnace, the steam is automatically cut off and the car is brought to a stand-still just as it is in a position to dump into the hopper.

**BELL OPERATING-CYLINDER.** At some suitable point, usually near the base of the furnace, a cylinder (AI)



**SKIP-CAR DUMPING INTO DISTRIBUTOR.**

Side view.

oval type used by this Company, and can be for being usually about 6,000 pounds of coke.

steam or electric power can be used as the regular two-cylinder type of hoist. clutch and Friction-brake of large to take the length of rope required especially designed for this class detail.

electric hoists, the automatic stop and most efficient device yet a heavy load of ore or a much to the top of the furnace, the fectly by the stop, and it is at the desired point, when it hoists an automatic stopping such a manner that when the





**THE BROWN PATENT FURNACE-HOIST (ZINC FURNACE).**  
NEW JERSEY ZINC COMPANY, Hazard, Pennsylvania.

operated either by steam or compressed air is provided for operating (*i. e.*, raising and lowering) the lower bell. A three-way valve of special design, located on a convenient stand in the operator's house, enables the operator to control the opening and closing of the bell and the feeding of the furnace.

**INDICATORS.** Placed on the wall in the engine-house, in plain view of the operator, there are indicators which register the various operations as follows:

*First.* A large dial (K) with a pointer, or indicator, which indicates the amount the bell is lowered each time.

*Second.* A similar dial and pointer (L), which indicates the position of the opening in the distributor-cone at all times, so that the operator can tell the exact position on the bell at which the next load will be deposited.

*Third.* Attached to the engine mechanism there is a trip-counter, which registers automatically the number of loads taken up to the furnace, and when the full number to make a charge has been dumped, the indicator returns automatically to the zero point.

*Fourth.* There is a second registering device which records the total number of trips made in any definite time, as in a month or in several months.

*Fifth.* There are two or four testing-rods (E) provided, as may be desired, which indicate the height of the stock in the furnace. These rods are operated by a small drum and hand-crank, placed near the bottom of the furnace-stack, or in the operator's house, as desired.

**BOTTOM-FILLING.** The skip-car descends into a pit at the lower end of the bridge, so that its front, or open end, is below, or on a level with, the stock-house floor. The bottom-filling is therefore so much easier than when empty barrows have to be removed before full ones can be put upon, as with the ordinary hoisting-cage, and the labor of one or two men each twenty-four hours is sometimes saved in the bottom-filling. With the "BROWNHOIST" system of bins and larries, as described elsewhere in this book, hand-labor is entirely dispensed with for bottom-filling.

**DOUBLE-SKIP HOIST.** The preceding description has been given with reference to a single-skip hoist arrangement, as this is the type we recommend. In cases, however, where the furnaces are equipped with a double-skip hoist, or where the customer prefers it, our distributor mechanism is equally well adapted. The principal difference in the two arrangements being that for the double-skip hoist the distributor has to be provided with a somewhat wider hopper.

There is also a slight change in the distributor rotating mechanism. With the single-hoist the distributor is only rotated by the return trip of the car. In the double-skip arrangement the rotating of the distributor is done entirely

by the motion of one of the two cars, the sheave at the top of the furnace, over which the rope passes from the other car, not being connected with the distributor mechanism. Each trip of the car which drives the mechanism rotates the distributor through the desired angle at every trip of the car, either up or down the furnace incline, so that the load taken up on either car is dumped in a different place on the bell. In all other respects the arrangement for the single- and double-skip hoist is identical.

**ADVANTAGES OF THIS TYPE OF HOIST.** The labor of two men only being required in each twenty-four hours, it is easy to reckon the saving in cost of labor for top-filling, and in addition to this saving of labor in filling, the hoisting-plant has the following advantages:

*First.* The employment of men amid the noxious gases at the furnace-top is entirely avoided.

*Second.* The filling and distributing of stock in the furnace is accomplished in a regular manner, night and day, so that the irregularity in stock-level, so common in ordinary practice, is entirely avoided.

*Third.* The automatic charging of the furnace produces an unvarying and even distribution of the proportion of lime, ore, and coke, so necessary for successful smelting of ore.

*Fourth.* The irregular working of the furnace, cutting in grooves, channeling and hanging on sides, slipping of stock, and other irregularities due to the carelessness of top-fillers is entirely avoided.

*Fifth.* The breakage of fuel is reduced to the minimum, owing to the drop of the material from the skip to the bell being little if any greater than by the old method of hand-filling, and in this respect is in marked contrast to any other top-filling device hitherto known.

*Sixth.* A reduction in fuel-consumption is effected, due to the good distribution, and the reduction in breakage obtained by this distribution.

## PARTIAL LIST OF USERS OF FURNACE-HOISTS AND DISTRIBUTORS

### UNITED STATES.

	STEAM.	ELECTRIC.
Stewart Iron Co., Sharon, Pennsylvania . . . . .	1	
Ohio Iron Co. (National Steel Co.), Zanesville, Ohio . . . . .	1	
New Jersey Zinc Co., Palmerton, Pennsylvania . . . . .		1
La Belle Iron Works, Steubenville, Ohio . . . . .	2	
Lacey Buek Iron Co., Trussville, Alabama . . . . .	1	
Lookout Mountain Iron Co., Battelle, Alabama . . . . .	1	
Tennessee Coal, Iron & Railroad Co., Ensley, Alabama . . . . .	1	
Salem Iron Co., Leetonia, Ohio . . . . .	1	
Woodward Iron Co., Birmingham, Alabama . . . . .	1	
Cleveland Furnace Co., Cleveland, Ohio . . . . .	1	

### ENGLAND

Palmer Shipbuilding Co., Jarrow-on-Tyne . . . . .	1	
Millom & Askham Hematite Iron Co., Millom . . . . .	1	
Carnforth Hematite Iron Co., Carnforth, Lancashire . . . . .	1	
Cargo Fleet Iron Co., Middleborough . . . . .	2	
Ebbw Vale Steel, Iron & Coal Co., Ebbw-Vale, Monmouthshire . . . . .		1

### FRANCE.

Forges et Acieries du Nord, Valenciennes . . . . .	1	
Vezin Aulnoye, Homecourt . . . . .		2

### BELGIUM.

John Cockerill, Seraing . . . . .	1	1
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### AUSTRIA.

Alpinen Montangesellschaft, Eisenerz . . . . .		2
Witkowitz Bergbau und Eisenhutte Gewerkschaft, Moravia . . . . .	1	

### CANADA.

Dominion Iron & Steel Co., Sydney, C. B. . . . .	1	
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## “BROWNHOIST” AUTOMATIC TUBS AND BUCKETS. BROWN’S PATENT.



BROWN’S PATENT COAL GRAB-BUCKET.

**W**E MAKE a variety of Tubs and Buckets for various uses in connection with our hoisting and conveying machinery. Each type is especially well adapted to certain work.

Our Ore Grab-buckets, as well as our Coal Grab-buckets, shown on this and the following pages, combine a new principle—that of opening wide and scraping material into and thereby filling the bucket. It is a well-known fact that iron ore, broken stone, and many other dense materials can not be shoveled by the ordinary grab-bucket, which depends on penetration, from the top downward. These buckets do not depend on their penetrative effect, but on the scraping effect. They are a perfect success and will fill in the hardest and densest kind of ore. In fact, we find some difficulty in keeping both ore and coal grab-buckets from overfilling.

These “BROWNHOIST” grab-buckets are designed so that the edges of the digging-spades in closing keep very nearly in a horizontal plane. The pictures on pages 147 and 148 show the action of these buckets in actual work.

The “BROWNHOIST” Shovel-bucket, shown on pages 149 and 150, is used on many of the bridge tramway and other plants shown on the preceding pages of this book. It will successfully shovel iron ore, coal, sand, limestone, clay, sulphur, broken stone, etc. This Shovel-bucket was developed by THE BROWN HOISTING MACHINERY COMPANY, and is very favorably thought of wherever it is used.

We also make the “BROWNHOIST” Automatic Dumping-tub with inner removable wearing lining, a theoretically perfect tub in design and the strongest and most substantial automatic tub built. Actual practice shows that one of these tubs will outwear any ten ordinary tubs.

We also make a great variety of Special Tubs, Buckets, and Grabs to suit every condition, and the “BROWNHOIST” Tubs and Buckets are now extensively used and favorably known all over the world. A few of our many special buckets are shown on page 151.



BROWN’S PATENT ORE GRAB-BUCKET.



FILLING FROM ORE PILE.



FILLING IN ORE-VESSEL.



DUMPING IN AIR.

**THE "BROWNHOIST" PATENT GRAB-BUCKET FOR HANDLING COAL.**

As used on all "BROWNHOIST" Bridge Tramway and other machines.



BUCKET OPEN.



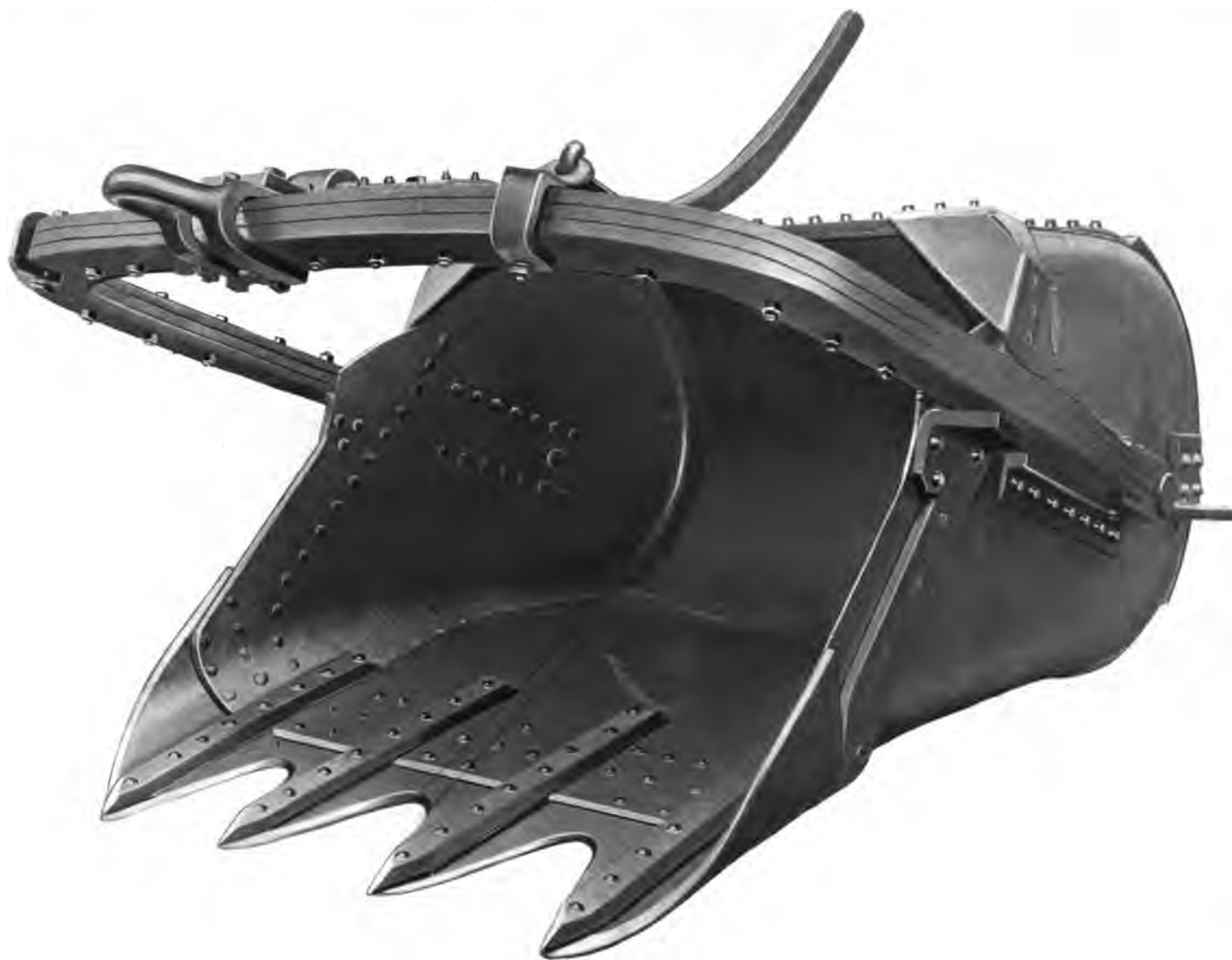
BUCKET CLOSING.



BUCKET CLOSED.

# THE "BROWNHOIST" COAL GRAB-BUCKET FOR HANDLING IRON ORE.

As used on all "BROWNHOIST" Bridge Tramway and other machines.



SHOVEL-BUCKET. POSITION WHEN SHOVELING.

**THE "BROWNHOIST" SHOVEL-BUCKET.**

For shoveling ore, coal, limestone, etc. Very heavy construction. As used on all "BROWNHOIST" Bridge Tramway and other machines.



**THE "BROWNHIST" SHOVEL-BUCKET SHOVELING LIMESTONE.**

This Bucket will successfully shovel iron ore, coal, limestone, sulphur, sand, clay, etc.



FIGURE 1. AUTOMATIC DUMPING-TUB.



FIGURE 2. 10-TON SPECIAL STOCKING-TUB.



FIGURE 3. "BROWNHOIST" SINGLE-ROPE GRAB-BUCKET FOR COAL OR ORE.



FIGURES 4 AND 5. HOT-BILLET GRATE

GROUP OF "BROWNHOIST" BUCKETS FOR VARIOUS PURPOSES.

## THE "BROWNHOIST" SUSPENDED ORE-POCKETS.

### THE "BROWNHOIST" ELECTRIC BLAST-FURNACE LARRIES.

**N**O SYSTEM OF STORING and rehandling ore would be complete without the necessary machinery and appliances for pocketing the ore, limestone, etc., and delivering same in the proper mixtures and quantities to the blast-furnace.

THE BROWN HOISTING MACHINERY COMPANY have made a study of this problem, in connection with their storage and rehandling bridges, and herewith present the "BROWNHOIST" System of Steel Suspension Bins and Pockets with electric larries running underneath same, being the most perfect system ever devised for this work.

OUR WORK IN THIS DIRECTION has nearly all been with blast-furnaces of the largest class, thereby showing the confidence placed in us by the leading furnace-men.

THE "BROWNHOIST" STEEL BINS are shown in the pictures on the following pages, and consist of what is known as a suspended bin, the lower chord of which has the same tension throughout, a design of bin requiring in its construction the least amount of material for a given strength. This form of bin was designed by Mr. Alexander E. Brown, Vice-President and Chief Engineer of this Company, some ten years ago. Many of the pictures in the preceding part of this book, especially under the subject of "COAL- AND ORE-STORAGE," show our "BROWNHOIST" Bridge Tramway Machines having their double-pier end mounted on top of these "BROWNHOIST" Bins. Being thus mounted, the ore is readily rehandled from the pile over which the bridge spans into these bins, or pockets, and in this way they are always kept filled. Besides this, these "BROWNHOIST" Bins are generally arranged so hopper-bottom cars can be dumped directly into them from the railroad-tracks running on top. These bins are generally placed in a direct line with the furnace-charging machinery, so the electric larries running underneath, as shown in the pictures, can pass at high speed in a straight line from under the bins direct to and over the furnace-hoist skip-car. These electric larries have hoppers, or buckets, with bottom outlet, and travel under the bins on elevated runway-rails, similar to an electric traveling crane, or on surface-tracks. The operator rides with them. Underneath the row of bins, and above the larry-hopper, each bin-compartment has a valve, or gate, operated by an electric motor, which is carried on the larry proper. When the larry is under the compartment from which ore is to be drawn, the operator simply connects his motor to the gate-mechanism and draws off the ore until he has enough of that particular kind. He then moves the larry to the next compartment, and so on, measuring each mixture by the beam-scale, also carried on the larry. These scales are of the usual blast-furnace type, and provided with as many beams as required. There is also on each larry connected with the scales an indicator, which shows when the bucket has received nearly the desired



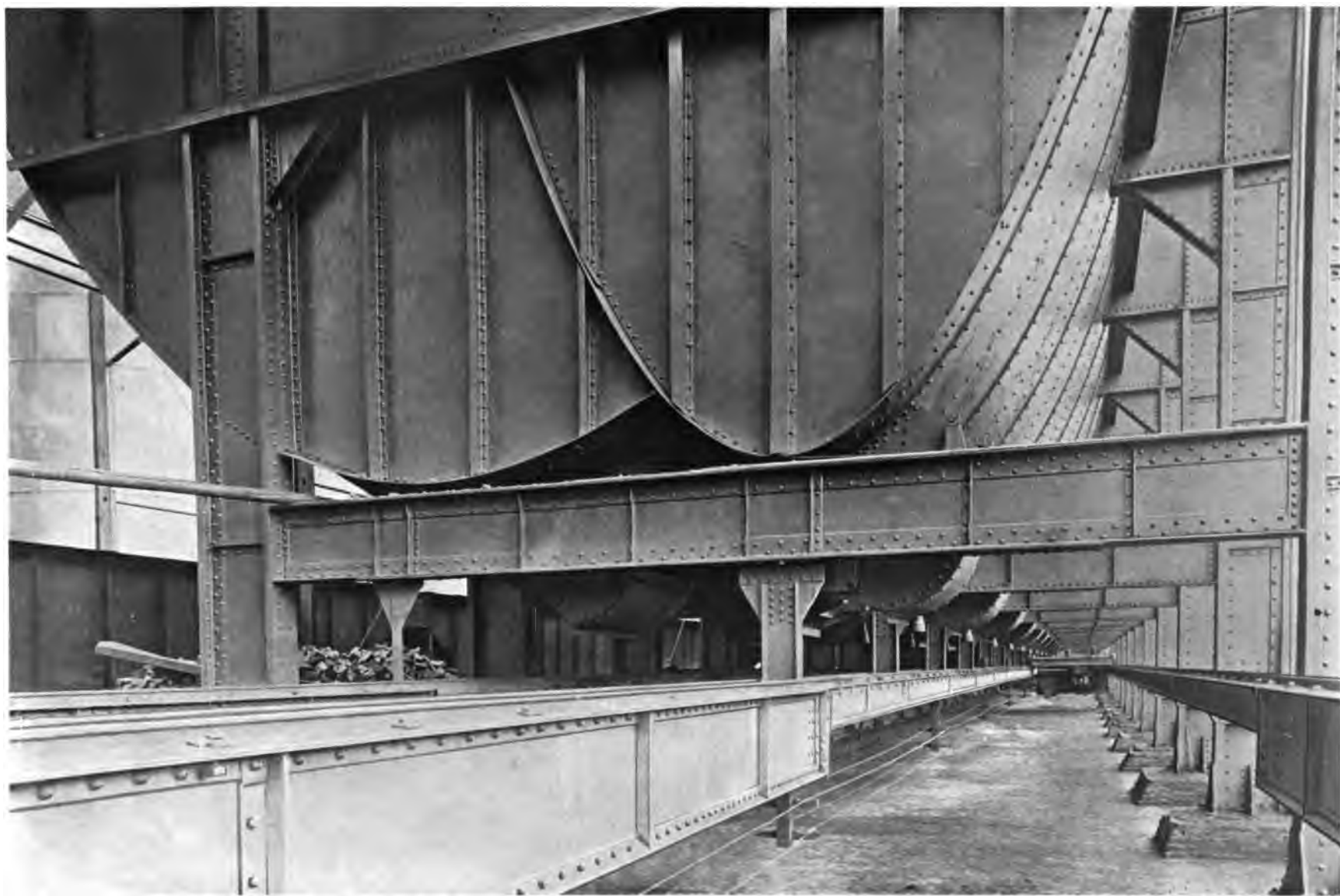


**LINE OF "BROWNHOIST" SUSPENDED STEEL ORE-POCKETS, 633 FEET LONG.**  
CRUCIBLE STEEL COMPANY, Clairton, Pennsylvania. With Electric Larries running underneath.



**DOUBLE ROW OF "BROWNHOIST" SUSPENDED STEEL ORE-POCKETS, 633 FEET LONG.**

CRUCIBLE STEEL COMPANY, Clairton, Pennsylvania. Showing valves for filling Larries.



**"BROWNHOIST" DOUBLE SUSPENDED ORE-POCKET.**  
Electric Larry in distance.



**LINE OF "BROWNHOIST" SUSPENDED STEEL ORE-POCKETS, 240 FEET LONG.**

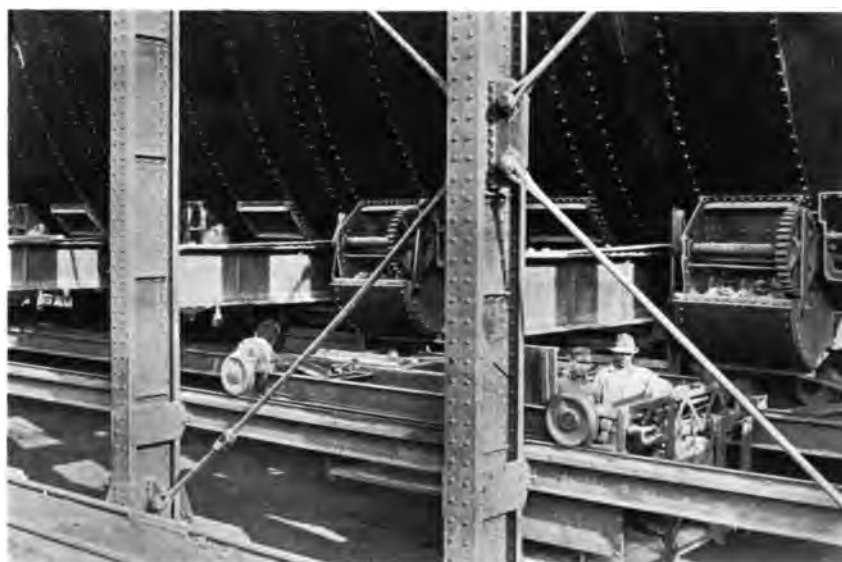
LA BELLE IRON WORKS, Steubenville, Ohio. Having Electric Larry equipment.



**VIEW UNDERNEATH STEEL ORE-POCKETS.**

Shown on opposite page, showing Electric Larries with their furnace-filling hoppers and electric valves or gates for taking ore from pockets.  
At LA BELLE IRON WORKS, Steubenville, Ohio.





FOUR PICTURES SHOWING THE "BROWNHOOIST" ELECTRIC ORE-LARRIES PASSING UNDER POCKETS, SYSTEM OF VALVES, ETC.

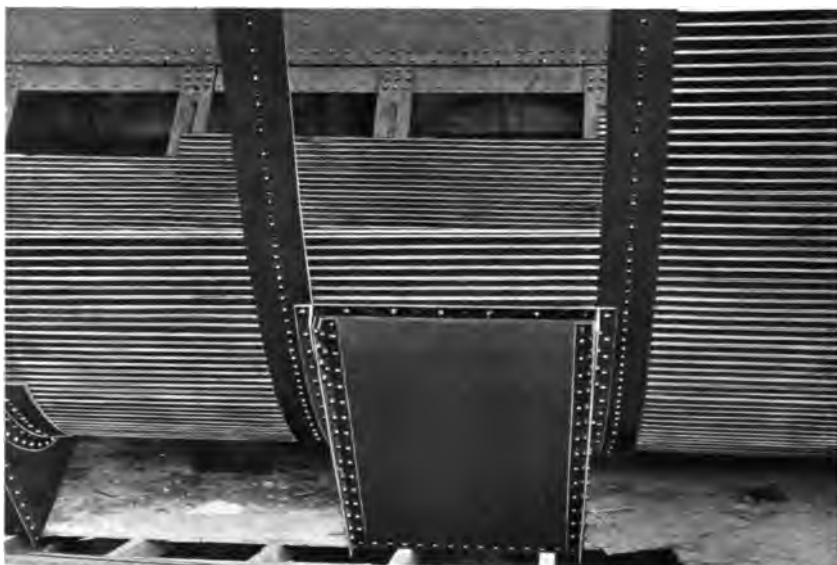


FIGURE 1.



FIGURE 2.



FIGURE 3.



FIGURE 4.

**"BROWNHOIST" SUSPENSION COAL-POCKET, LINED WITH CEMENT.**

Of Ferreinclave (Steel and Cement Construction), manufactured exclusively by THE BROWN HOISTING MACHINERY COMPANY.  
 Figures 1 and 2. Construction, showing Ferreinclave sheets suspended from straps. Figures 3 and 4. Showing finished pocket lined inside and outside with cement.



quantity of each kind of material. Each larry is likewise provided with mechanism by means of which the weight of the bucket and contents are taken off the knife-edges of the scales when the larry is in motion. When his larry has a full charge the operator runs it rapidly down to and over the furnace, filling skip, and transfers his charge to same, whence it is lifted and dumped into stack.

On some recent "BROWNHOIST" Bins we have provided an outside hot-air jacket to prevent the ore freezing in cold weather.

We have designed several types of larries and bins to meet the various conditions arising at different plants, the most interesting of which are shown in the pictures on the preceding pages.

### PARTIAL LIST OF USERS OF "BROWNHOIST" STEEL ORE-POCKETS AND -BINS.

Morris Guild & Co., Kings Mines, Ohio . . . . .	30 lineal feet.
Carnegie Steel Co., Pittsburg, Pennsylvania . . . . .	789 " "
Carnegie Steel Co., Pittsburg, Pennsylvania . . . . .	725 " "
La Belle Iron Works, Steubenville, Ohio . . . . .	100 " "
Crucible Steel Co. of America, Clairton, Pennsylvania . . . . .	634 " "
Buffalo & Susquehanna Iron Co., Buffalo, New York . . . . .	225 " "
Cleveland Furnace Co., Cleveland, Ohio . . . . .	144 " "
La Belle Iron Works, Steubenville, Ohio . . . . .	140 " "

### PARTIAL LIST OF USERS OF THE "BROWNHOIST" LARRY SYSTEM.

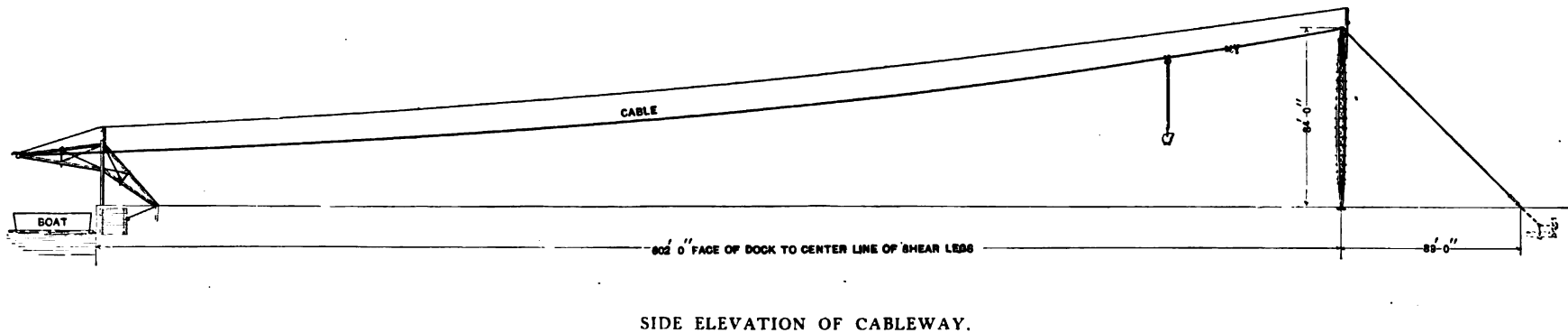
Carnegie Steel Co., Pittsburg, Pennsylvania . . . . .	17-foot Larries.
Crucible Steel Co. of America, Clairton, Pennsylvania . . . . .	6- " "
La Belle Iron Works, Steubenville, Ohio . . . . .	4- " "
Cleveland Furnace Co., Cleveland, Ohio . . . . .	2- " "
Buffalo & Susquehanna Iron Co., Buffalo, New York . . . . .	4- " "

## CABLEWAY.

THE "BROWNHOIST" CABLEWAY is adapted for handling material where long spans are desired at moderate cost and where it is not practical or desirable to use our Standard Bridge Tramway.

CONSTRUCTION. Cableways can be constructed either with rigid piers or with one or both piers movable by hand or power. Where both piers are movable by power both are controlled from one point by a single operator. Pier-construction is generally of steel.

USES. The Cableway is particularly well adapted for use in mines, quarries, works, etc., or for handling sand, coal, ore,



etc., from barges, or for handling stone in heavy masonry-work, such as retaining-walls, dams, etc., or in any case where the cable can span the space where the material is to be taken from or placed.

OPERATION. The Cableway can be operated with any of our automatic dumping-tubs or -buckets and has the same bucket movements, and the operation is similar to that of our Bridge Tramway Plants, heretofore described.



### **CABLEWAY**

928-foot span, 4 tons capacity, at works of the ALPINE MONTANGESELLSCHAFT, Donawitz, Austria.

# PARTIAL LIST OF CABLEWAYS IN OPERATION.

## UNITED STATES.

Aurora Iron Mining Co., Hurley, Ohio . . . . .	1	Cableway.
Pittsburg Plate Glass Co., Creighton and Tarentum, Pennsylvania . . . . .	3	"
Carnegie Steel Co., Bessemer, Pennsylvania . . . . .	1	"
Lumberman's Mining Co., Iron Mountain, Missouri . . . . .	1	"
Grasselli Chemical Co., Willow, Ohio . . . . .	1	"
Morris Guild & Co., Kings Mines, Ohio . . . . .	1	"
Allegheney Plate Glass Co., Hite, Pennsylvania . . . . .	1	"

## FRANCE.

Solvay & Co., Varangeville . . . . .	1	"
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## AUSTRIA.

Alpine Montangesellschaft, Vienna . . . . .	1	"
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CABLEWAY AT THE CARNEGIE STEEL COMPANY, LIMITED.  
EDGAR THOMPSON PLANT, Braddock, Pennsylvania.

## ONE-HUNDRED-TON FLOATING CANTILEVER CRANE "HERCULES." UNITED STATES NAVY.

**T**HE CRANE shown on the next page was built by this Company for the United States Navy. The construction is entirely of steel, including steel pontoon 60 feet by 100 feet by 11 feet depth, with two feet freeboard under full load.

**CONSTRUCTION.** The design of this crane is a departure from floating cranes heretofore made. The cantilever-arms are rigid, and the suspended end to end of arms. The legs are far enough apart to allow any load through. In this way a load can be placed on a separate arm. This is a great advantage crane, which can not reach its **COUNTERWEIGHT.**

the usual water ballast, an auto-tons, which travels through its. It is automatically operated by in such a way as to keep the times, irrespective of the load or **MACHINERY.** The

are located in the pontoon the counterweight-path. The

engines at such a height to command a clear view of the hook in every stage of its movement.

**STEAM-CAPSTANS.** Four steam-capstans, one at each corner, are provided for warping the crane into position, etc.

**PONTOON.** The deck of the pontoon is strong enough to carry heavy guns or armor-plate.

**CAPACITY.** While this crane has an official rating of one hundred gross tons, yet the specifications under which it is built provide for much heavier emergency lifts.

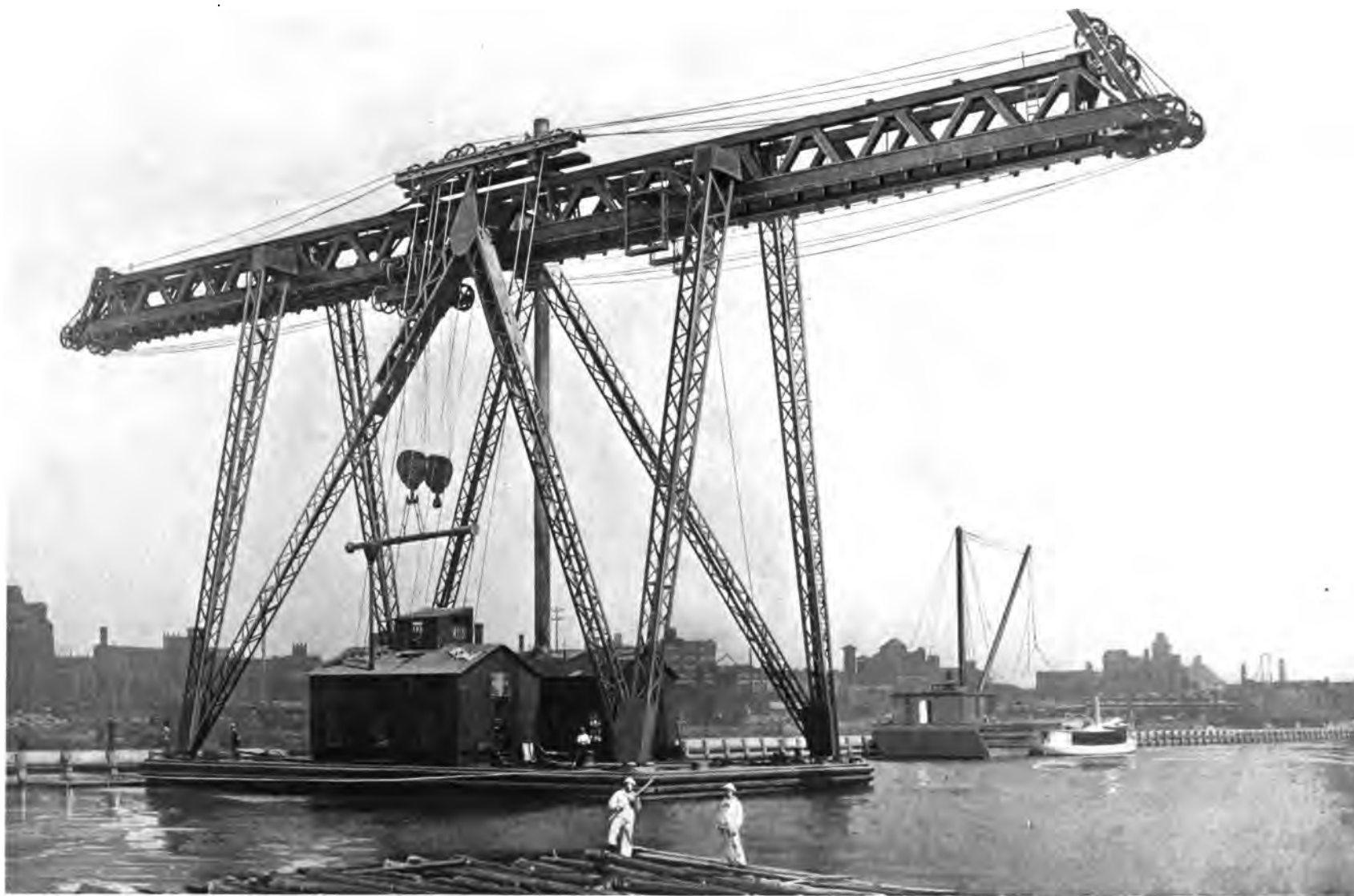


LIFTING TURRET OFF THE U. S. MONITOR "FLORIDA." WEIGHT 90 TONS.

load passes through the legs from supporting the cantilevers are far up to forty feet in width to pass be deposited on deck of pontoon under the rear cantilever-over the old form of floating own deck with a heavy load.

The pontoon has, in addition to matic counterweight weighing 250 central portion from end to end. an independent pair of engines pontoon on an even keel at all changes of load.

engines, boilers, and pumps amidships, on either side of operators' house is above the



**FLOATING CANTILEVER CRANE "HERCULES."**  
UNITED STATES NAVY, New York Navy Yard. One hundred gross tons capacity.





**FLOATING CANTILEVER CRANE "HERCULES."**  
UNITED STATES NAVY, New York Navy Yard. Slings test load.



COALING "DOUBLE-HEADER" ON B. & O.

## LOCOMOTIVE-COALING STATIONS.

**C**OAL-POCKET. The coal-pocket is built of steel, of the suspended-bin type, in which the sides and bottom of the pocket take the natural lines of a filled bag suspended from two points. This form economizes greatly in the use of material in the construction. A pocket of this type, of same capacity and strength, requires from 50 to 80 per cent. less material than a steel pocket of any other construction. The "BROWNHOIST" pocket is built entirely of steel sheets and is lined with concrete if necessary. It is hung from girders supported on four steel posts, which rest on stone foundations, and is covered in with a corrugated-iron roof, with sliding-covers over hatches through which the coal is dumped.

**GRAVITY DUMPING-TUBS.** These tubs are built of steel, of box form, with two bottom doors hinged at opposite sides. These doors open after the tub has descended to a fixed point, and dump the coal at a central point on tender. The position of the doors when open prevents spilling the coal. The tubs are overcounterweighted when empty, the counterweight pulling them back into position to be filled again. The filled tubs are heavier than the counterweight, and descend slowly under perfect control of attendant when he releases them by pulling on a pendant hand-chain. It will be seen, therefore, that by simply pulling on this hand-chain and releasing the tubs, they descend, dump, return, and lock themselves in their former position automatically. Then they are ready for filling, which is done quickly by one of the attendants by means of a proper valve for the purpose.

**WEIGHING-SCALES.** Attached to each of the above tubs is a

set of beam weighing-scales, whereby the coal in the tub is *accurately* weighed. This keeps a perfect check on all the coal furnished to locomotives.

**HOISTING AND CONVEYING MACHINERY.** A complete Brown Hoisting and Conveying Machine is used for hoisting the coal, for filling the pocket, and hoisting out the ashes. This consists of an engine with the necessary drums, trolley, sheaves, etc., controlled by levers by the operator in the top house shown in the picture on page 170. One man operates this apparatus in all its functions, and it has a capacity for handling from 50 to 100 tubs per hour. A one-ton capacity tub is generally used.

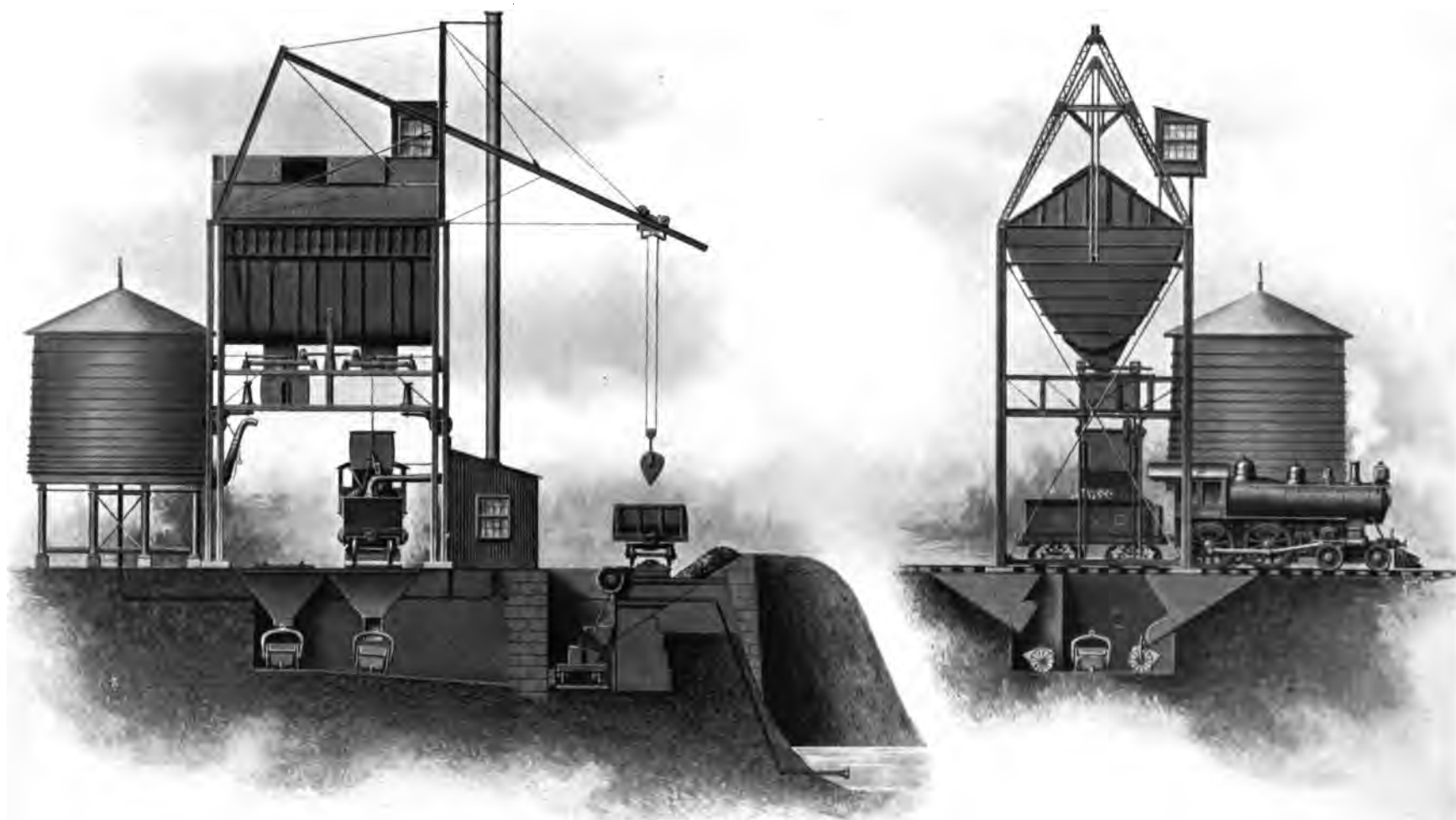
**ASH-PITS.** These are built of steel placed under the locomotive at convenient points, so that ashes can be cleaned out while the coal is being put aboard the locomotive. Each pit is provided with a very simple and effective valve at its lower point, so that the ashes can be scraped out into the automatic dumping-tubs shown in the picture. They are then dumped into a separate bin or car placed on siding to receive them.

**COAL- AND ASHES-HANDLING TUBS.** The automatic dumping-tubs used for charging the coal-pocket and for taking out the ashes are of our regular "BROWNHOIST" construction. The ash-tubs are fitted with two wheels of large diameter at the sides and a small castor in the rear, so they can be easily moved by the attendant from under the ash-chutes to a point whence they are hoisted into car or bin. For hoisting the coal into the pocket, either an automatic dumping-tub or one of our regular "BROWNHOIST" Grab-buckets is used. In the latter case, the coal would run directly into a pit to one side of car, from which pit the grab-bucket would take the coal.

**COAL-SIDING.** The arrangement of tracks for coal-siding, on which the coal in cars is delivered to the station, can be made to suit conditions. One or more tracks can be provided, on one of which cars for taking the ashes can always be placed, or a separate pocket can be built over one of these tracks into which the ashes can be dumped and drawn into cars at will.

**BREAKAGE OF COAL.** It will be seen that coal can be handled from the incoming car to the coal-pocket and to locomotive-tender by this plant with minimum breakage of the coal, where non-breakage of the coal is considered a valuable feature. The hoisting and conveying apparatus allows the tub to be lowered and dumped directly against the coal in the pocket, and it is not necessary for the coal to fall any distance in dumping.

**WATER-SUPPLY FOR LOCOMOTIVES.** The steam-plant can supply the pump for filling the water-tank shown in the picture for locomotive water-supply, and the same men who operate the coaling-station can attend to this.



**SIDE AND END SECTION OF "BROWNHOIST" LOCOMOTIVE-COALING STATION.**

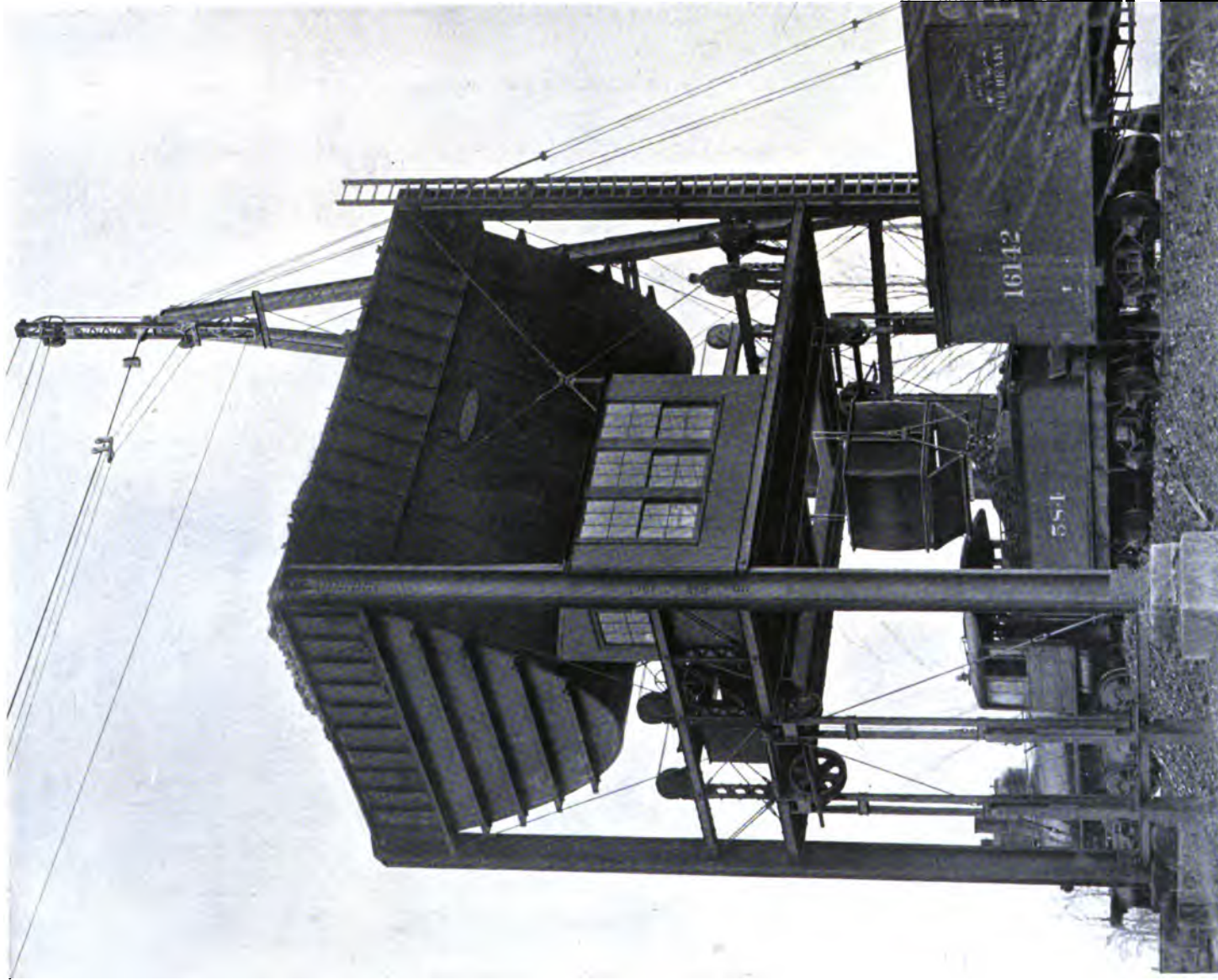


**LOCOMOTIVE-COALING STATION.**

Built for the **BALTIMORE & OHIO RAILROAD** at Kings Mines, Ohio.

Coal-pocket being filled by "BROWNHOIST" Cableway from mine.

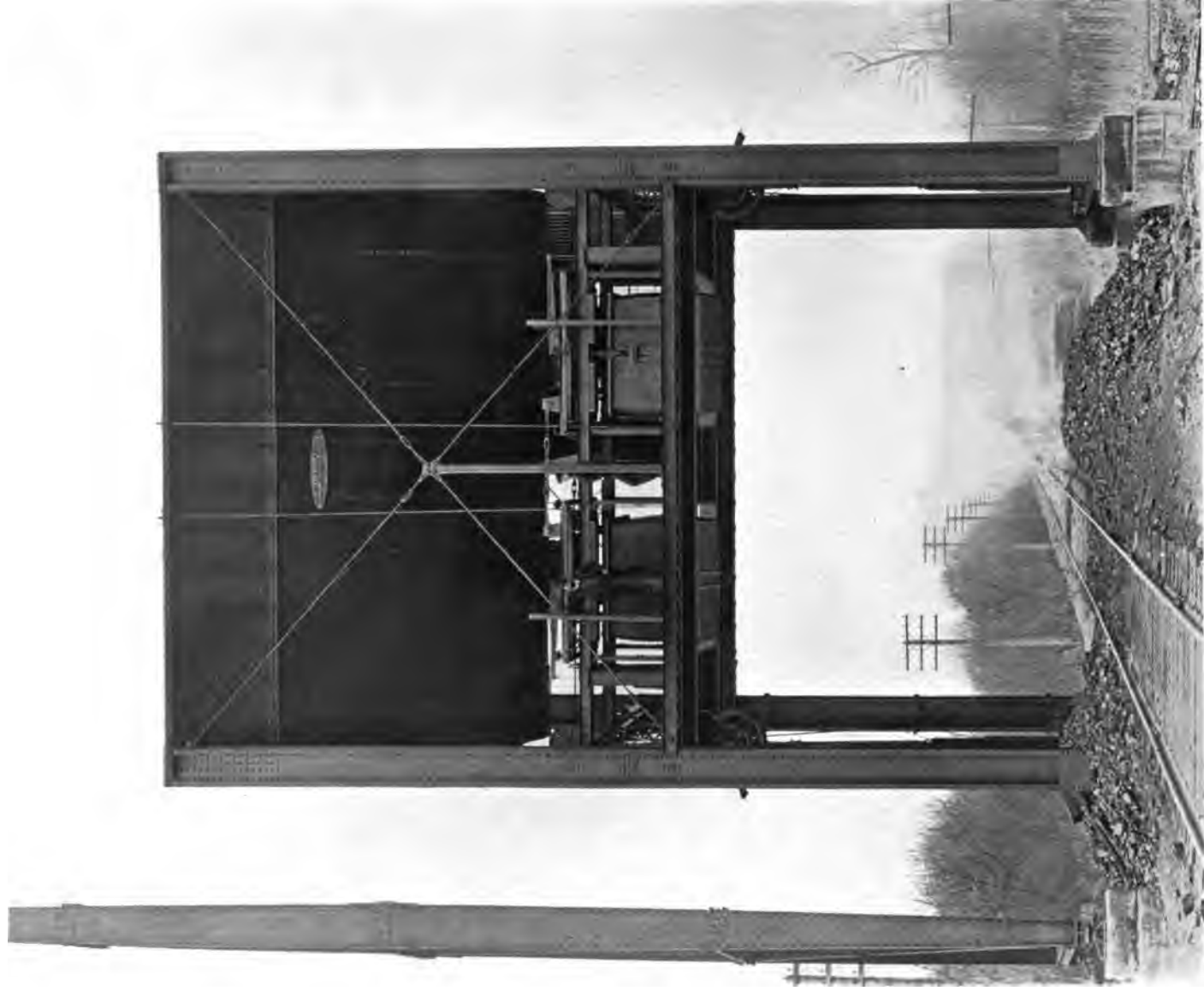




**LOCOMOTIVE-COALING STATION.**

Built for the BALTIMORE & OHIO RAILROAD at Kings Mines, Ohio.

Locomotive taking coal from gravity bottom-dumping tub.



**LOCOMOTIVE-COALING STATION.**  
Built for the BALTIMORE & OHIO RAILROAD at Kings Mines, Ohio.  
Tubs in upper portion, filled, ready to supply locomotive.



**SAND-SUPPLY.** Dry sand can likewise be handled and furnished locomotives from separate bin properly arranged with this plant without increasing the working force.

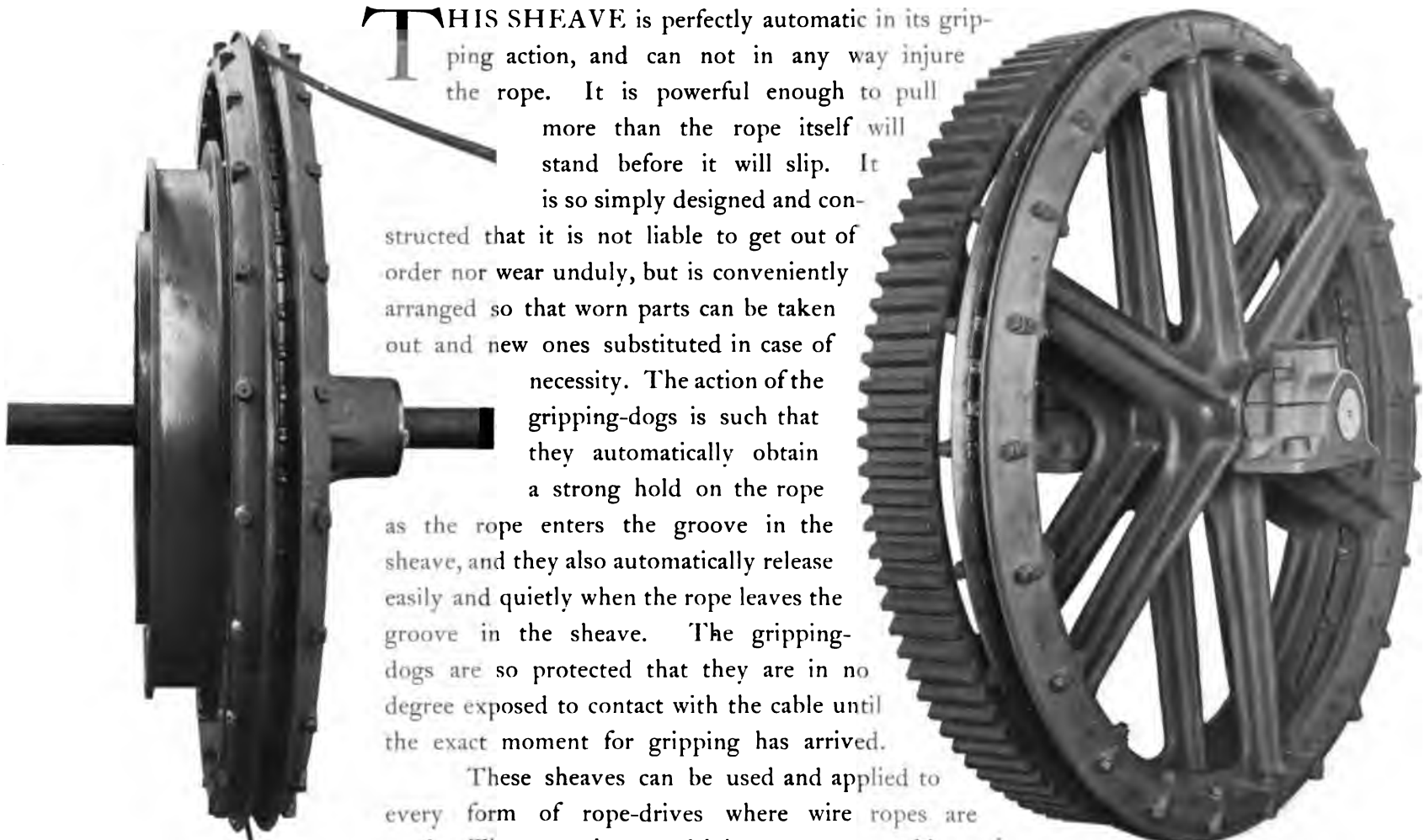
**STEAM-CAPSTANS.** One or more steam-capstans can be supplied for pulling the loaded coal- and ash-cars along siding to position for loading or unloading, if required.

**LIGHTING.** When desired, a dynamo can be added to engine-room for lighting the plant at night by electricity.

**CHANGES.** The general arrangement shown in the picture can, of course, be modified to meet local conditions, and we are, therefore, always ready to cheerfully furnish plans and prices on receipt of full information from any one interested.

**COAL-STORAGE SUPPLY.** These locomotive-coaling stations can be built in combination with any of our coal-storage and rehandling machines shown throughout this book.

## BROWN'S PATENT GRIP-SHEAVE.



**T**HIS SHEAVE is perfectly automatic in its gripping action, and can not in any way injure the rope. It is powerful enough to pull more than the rope itself will stand before it will slip. It is so simply designed and constructed that it is not liable to get out of order nor wear unduly, but is conveniently arranged so that worn parts can be taken out and new ones substituted in case of necessity. The action of the gripping-dogs is such that they automatically obtain a strong hold on the rope as the rope enters the groove in the sheave, and they also automatically release easily and quietly when the rope leaves the groove in the sheave. The gripping-dogs are so protected that they are in no degree exposed to contact with the cable until the exact moment for gripping has arrived.

These sheaves can be used and applied to every form of rope-drives where wire ropes are used. They are in use driving tramways, cableways, car-haulage plants, etc.



"BROWNHOIST" PIG-IRON BREAKER AND CRANE.

## THE "BROWNHOIST" PIG-IRON BREAKER.

FOR THE rapid handling and breaking of sand-molded foundry pig-iron The Brown Hoisting Machinery Company have designed a Pig-iron Breaker, consisting essentially of hydraulic press or breaker, special electric traveling crane, car-haulage, etc., shown on pages 179 and 180, figures 1 and 2, with the pictures showing general arrangement as installed on pages 177 and 178.

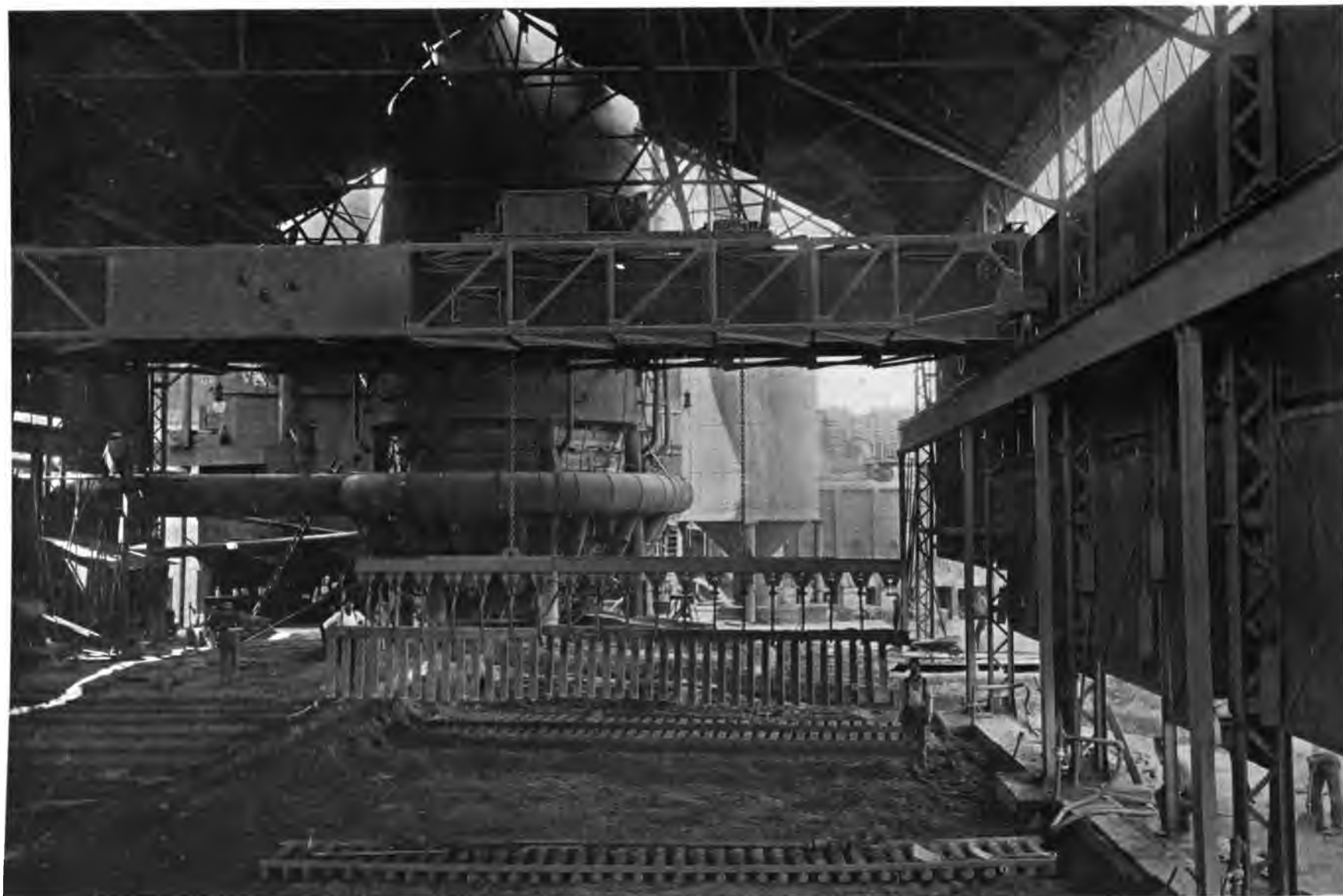
Special formers or molds are provided, made of steel and wood, for rapidly making the pig-bed mold and to insure that the sow and pigs, when cast, are of the proper size and distance apart for quick and easy manipulation by the crane and hydraulic press or breaker.

Special leveling-beams are also provided for quickly leveling the pig-bed mold prior to making the cast.

A special three-motor electric traveling crane is equipped with a hoisting-beam held from the trolley at two points. This hoisting-beam is equipped with a series of carrying-hooks and quickly lifts the cast from the mold and conveys it to the press or breaker at the lower end of cast-house. This crane is controlled from a stationary platform at the press or breaker by the same operator who runs the breaker. The method of slinging the cast to the crane controls the swinging of the load. It is therefore a comparatively easy matter to feed the cast through the press or breaker at the proper speed, breaking two pigs and a sow at each stroke of the plunger.

The dies of the press are wide enough to break two of the pigs simultaneously, breaking each pig at the middle of its length and at the junction with the sow. At the same time the sow is broken at the center between the supporting hooks; thus there are five breaks at the one stroke of the ram.

The crane and press being under direct control of the one operator not only reduces the labor cost, but makes the plant much more rapid and effective.



**"BROWNHOIST" PIG-IRON BREAKER AND CRANE.**  
DETROIT IRON AND STEEL COMPANY'S FURNACE, Detroit, Michigan.



**"BROWNHOIST" PIG-IRON BREAKER AND CRANE.**  
DETROIT IRON AND STEEL COMPANY, Detroit, Michigan.

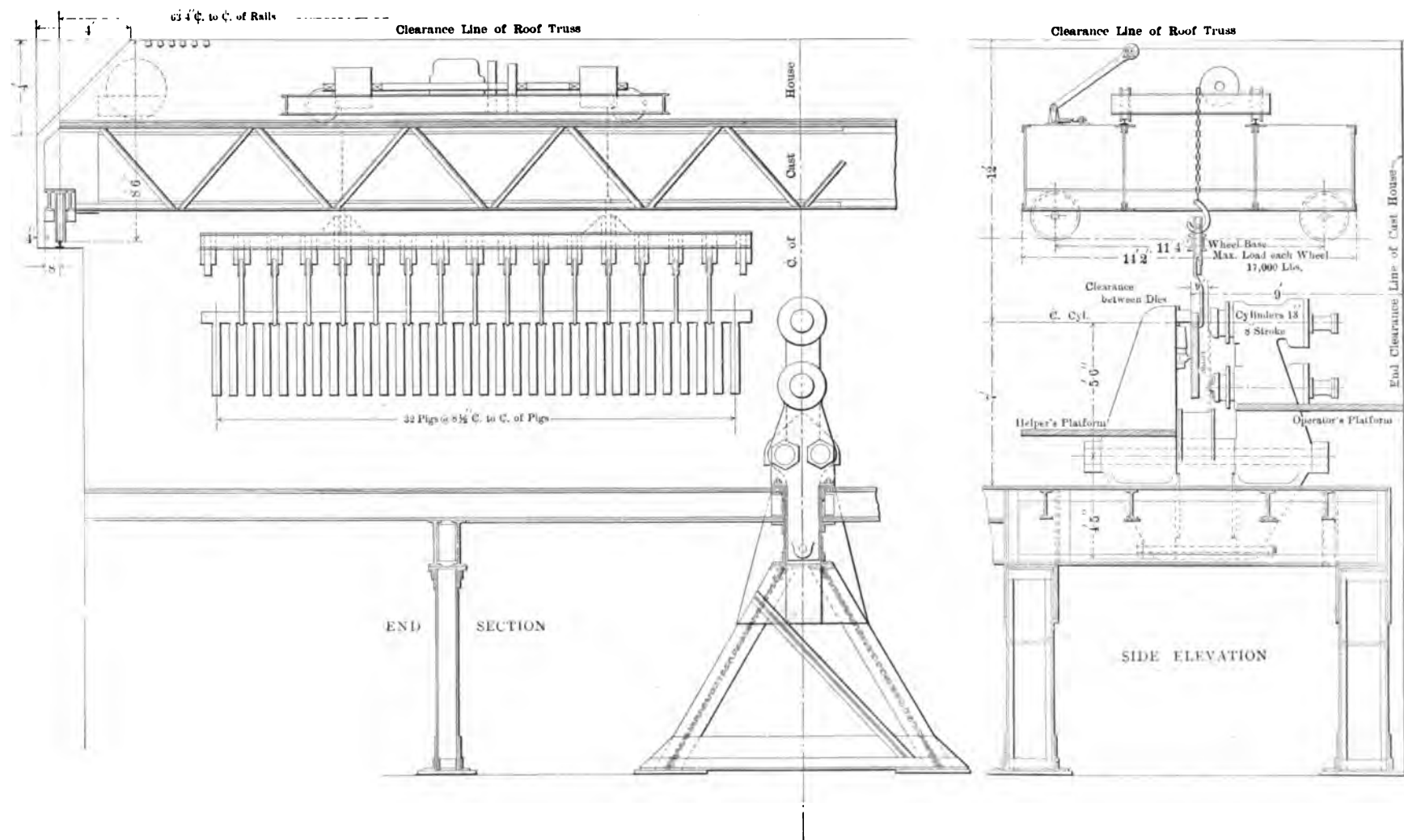


FIGURE 1. END SECTION AND SIDE ELEVATION OF CAST-HOUSE.  
Showing Pig-iron Breaker and Crane and method of feeding pigs through the breaker.

The broken pig iron drops through a chute directly into cars underneath for shipment, and the surplus sand dropping from the iron is carried away through a second chute.

A car at a time is pulled into position under the breaker by means of the special car-haul motor and drums. When loaded this car is dropped out by gravity, the tracks being on a slight grade for that purpose. The arrangement of the tracks for the loaded cars may naturally be varied to suit the local conditions.

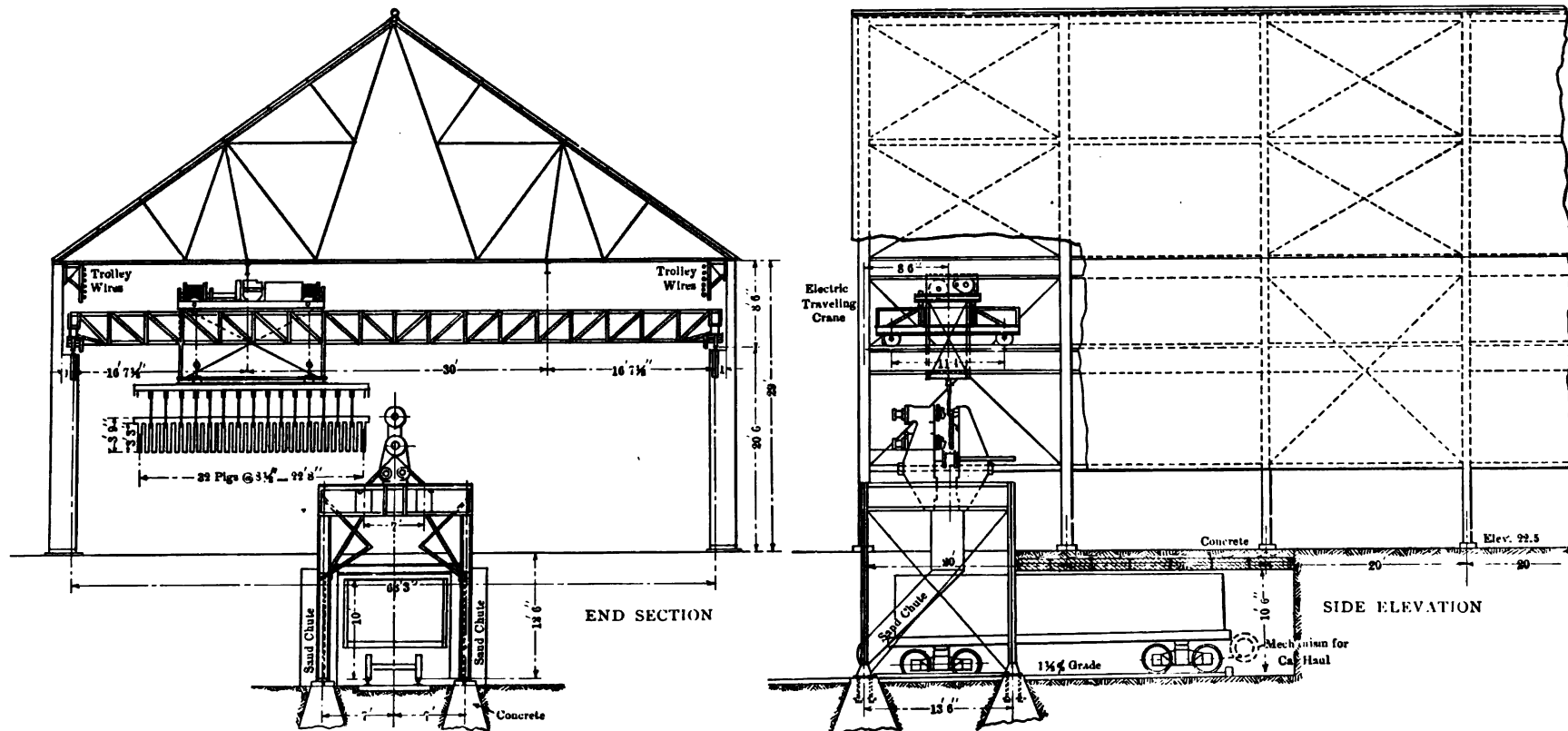


FIGURE 2. END SECTION AND SIDE ELEVATION OF CAST-HOUSE.  
Showing arrangement of Pig-breaker, Crane, Car-haul, Chutes, Loading-track, etc.



## PARTIAL LIST OF PIG-BREAKER PLANTS IN OPERATION.

### UNITED STATES.

Iroquois Furnace Company, South Chicago, Illinois . . . . .	2	Machines.
Salem Iron Company, Salem, Ohio . . . . .	1	"
Buffalo and Susquehanna Iron Company, Buffalo . . . . .	2	"
Detroit Iron and Steel Company . . . . .	1	"



**"BROWNHOIST" LOCOMOTIVE-CRANE WITH GRAB-BUCKET HANDLING ORE.**

Bucket, 22 cubic feet capacity; crane gauge, 4 feet 8½ inches; radius of boom, 30 feet. Can easily make 40 trips per hour. These cranes are used extensively about steel works and docks for unloading ore from cars, as shown — and for many other uses.

**R**EGARDING QUOTATIONS AND  
DELIVERIES.

---

DIRECTIONS FOR MAKING INQUIRIES  
AND ORDERING.

## REGARDING QUOTATIONS AND DELIVERIES.

**I**LLUSTRATIONS ARE from photographs and clearly show the machines and plants described. In making prices, however, we do not bind ourselves to every detail shown in these photographs, but prefer to give purchasers the benefit of any improvements we may make from time to time.

QUOTATIONS on standard machines and plants, or special applications of same to meet special requirements, will be supplied responsible concerns or individuals on application, when the inquiry is accompanied with the necessary plans and data as requested on page 185.

DELIVERY. Owing to the nature of this machinery, it is invariably either erected (on foundations furnished by the purchaser) and delivered to purchaser in complete running order, or the services of an expert only will be furnished to superintend erection and starting of plant, and to give instructions to men who are to operate same. In the latter case all common labor, blocking, tackle, false work, foundations, etc., are furnished by the purchaser.

ORDERS FOR EXPORT must be accompanied by a remittance on account, and remaining payments made against ocean-shipping papers when same are properly presented for payment to some previously designated responsible banking-house in New York City.

PACKING FOR SHIPMENT. No charges are made for packing for shipment to any part of the United States, Canada, or Mexico, reached by "all-rail" route, but extra charges will be made for packing for all export ocean shipments.

## DIRECTIONS FOR MAKING INQUIRIES AND ORDERING.

THE APPLIANCES manufactured by The Brown Hoisting Machinery Company are adapted to many and diverse uses. To enable the Company to intelligently determine the most suitable kind and the proper application of its apparatus and to make estimates, it is necessary that all the requirements, with full particulars, should accompany all inquiries and orders.

### FOR HOISTING- AND CONVEYING-MACHINES FOR HANDLING MATERIAL THE FOLLOWING INFORMATION IS REQUIRED:

1. A plan of location, with all distances accurately marked, and side elevation of same, with rise and fall of tide, etc.
2. The weight of material (in pounds, kilograms, or tons of 2,000 pounds) to be handled per day of ten hours.
3. The weight of the heaviest load. When heavy loads (two tons and upward) are to be moved, give the rate of speed desired; otherwise we will use our standard speeds.
4. Kind and description of materials. State if it is in large or small pieces; if large, give approximate size and weight of largest and average piece, weight per cubic foot loose, and specific gravity or number of cubic feet per ton of 2,000 pounds measured in the condition in which it is to be handled.
5. Give total distance to which material is to be conveyed. When clear spans are required, give length of same. If intermediate supports can be used, state the fact and give heights and distances apart of same. State also whether piers of clear spans are to be fixed (*i. e.*, permanent in one place) or to move along track parallel with dock-front or railroad-line.
6. State if steam or electric driving-machinery is wanted, and if the latter, the voltage at generator and voltage at motor, and kind of current.
7. State special conditions affecting the work in any way, if any exist.
8. State length of runway-track required.
9. If vessels are to be unloaded, give size of same, also size of largest and smallest hatches, number of hatches, etc.

## FOR CANTILEVER OR GANTRY CRANES.

In addition to the foregoing:

10. State height in clear at which hook is to lift load (from which we can determine height of crane).
11. Give span or total length of crane, in addition to plan asked for above.
12. Locate on cross-section any obstructions in line of travel which the crane must pass.

## FOR CAR-DUMPING MACHINES.

In addition to the foregoing:

13. Send drawings of largest and smallest cars to be handled by machine.

## FOR FURNACE-HOIST AND STOCK-DISTRIBUTOR.

1. Maximum quantity of iron the furnace is capable of producing, also any increase contemplated.
2. State quantities of each raw material required to make a ton of iron.
3. State the exact rotation in which these materials are to be charged into the furnace—that is, will the different materials be hoisted separately, or will the ore and limestone be hoisted together, or will there be any other combinations or mixture of stock in the skip-car? Also, how much of each material is it desired to have in the hopper at furnace-top before lowering the bell?
4. State if the ores, limestone, coke, etc., are fine, coarse, or lumpy, and if they are uniform.
5. State the weight of material in pounds, kilograms, or tons of 2,000 pounds, and give cubic feet of the materials per ton and specific gravity.
6. Give maximum, minimum, and average steam-pressure which will be supplied to the engine, either in pounds per square inch, kilograms per square centimeter, or atmospheres; and state whether this pressure is measured from the atmosphere as zero or absolute pressure from a vacuum. Also state in the same terms what pressure is supplied to raise and lower the furnace-bell, and the diameter of the bell-cylinder. Also if there is a condensing system in the works, and if it is desired to have the hoisting-engine to exhaust into said condenser. If electric power is to be used, give voltage at motor and kind of current.
7. Unless otherwise required or specified, the engine will be placed on the left side of hoist, with stairway on the right side of hoist when looking from foot of hoist toward furnace-stack. State if this arrangement will be satisfactory.

8. State whether a bell-lifting trolley is required.
9. Give complete detail drawings for bell, hopper, lip-ring, bell-rod, bell-lifting beam and support, top platform, and supporting structure; also weight of bell, hopper, and lip-ring.
10. Give general drawing (plan and elevation), with principal dimensions, which will allow us to correctly design bridge and top and bottom connections.
11. Indicate in a plan-drawing of furnace-stack the radial relation of the center-line of skip, the bell-operating beam, and the bell-lifting trolley, if one is required. It is likely that we can not always follow a customer's instructions exactly in regard to these things, but we will do so as far as possible.

### FOR LOCOMOTIVE-COALING STATIONS.

1. Submit a plan and cross-section of location to scale, showing all tracks and obstructions, with location of coaling-station marked thereon.
2. State capacity of pocket required in tons or cubic feet.
3. State capacity of coal per day or per hour that is required to be supplied to locomotives, and number of locomotives to be fueled in same time.
4. State kind of coal to be handled and if it is desired to prevent breakage.
5. State if steam or electric power is to be used for operation of plant.
6. State if we are to figure on water-supply for locomotive, and, if so, capacity in gallons of tank, and maximum and normal quantity taken at one time by locomotives.
7. State number of tracks to be equipped for fueling.
8. State if you desire separate ash-pocket, or if ashes are to be dumped directly into cars when taken from pit.
9. State if steam-capstans for pulling coal- and ash-cars are wanted.
10. Do you wish furnished with plant pocket and drying apparatus for supplying sand to engines? If so, state capacity required.
11. State if you wish included electric-lighting plant, or power station, or both.
12. Give all special conditions affecting the work in any way.



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# THE BROWN HOISTING MACHINERY COMPANY.

Engineers, Designers, and Manufacturers of

Special Machinery for Hoisting, Conveying, Storing, and Handling Material of all Kinds,

Under the Well-known "BROWNHIST" Patents.

Ore-handling  
Machinery  
for Handling Ore  
from Vessels,  
Docks, and Cars.  
Furnace-hoist  
and  
Stock-distributor  
for the  
Automatic Charging  
of  
Blast-furnaces,  
doing away with  
Top-fillers.



Coal-handling  
Machinery  
for  
Handling Coal from  
Vessels, Docks,  
and Cars.  
Machinery for  
Handling  
Structural Work,  
Marine Plates, etc.,  
in  
Shipbuilding  
Yards.

THREE-MOTOR ELECTRIC TRAVELING CRANE.

CLEVELAND.

NEW YORK.

PITTSBURG.

LONDON.

# THE BROWN HOISTING MACHINERY COMPANY.

Engineers, Designers, and Manufacturers of

Cranes of all Kinds Operated by Steam, Electricity, Hand, or Other Power,

Under the Well-known "BROWNHOIST" and Yale & Towne Patents.

Locomotive  
Cranes

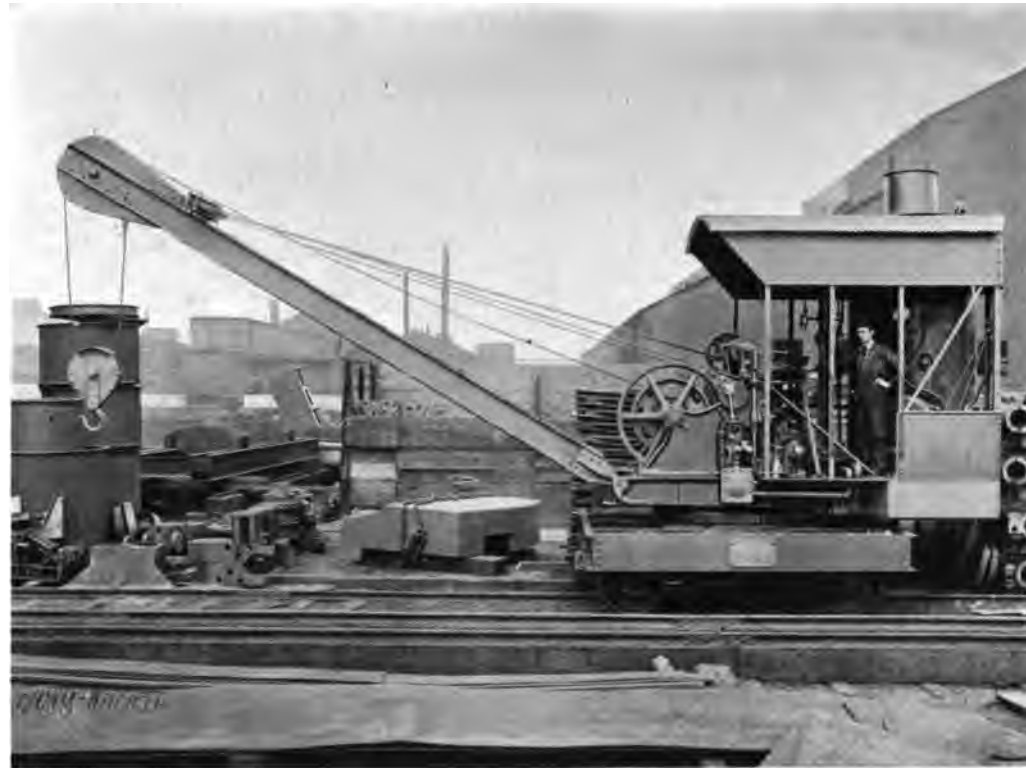
Electric  
Traveling Cranes

Pulley-block  
Cranes

Jib Cranes

Overhead Trolleys

Overhead  
Tramrail



Transfer Tables

Pillar Cranes

Wrecking Cranes

Hand Traveling  
Cranes

Bridge Cranes

Floating Cranes

Crabs and  
Winches

**10-TON LOCOMOTIVE CRANE, 26½-FOOT RADIUS STANDARD GAUGE.**

An illustrated Catalog of Cranes, 260 pages, will be sent on application to any of our offices.

CLEVELAND.

NEW YORK.

PITTSBURG.

LONDON.

# THE BROWN HOISTING MACHINERY COMPANY.

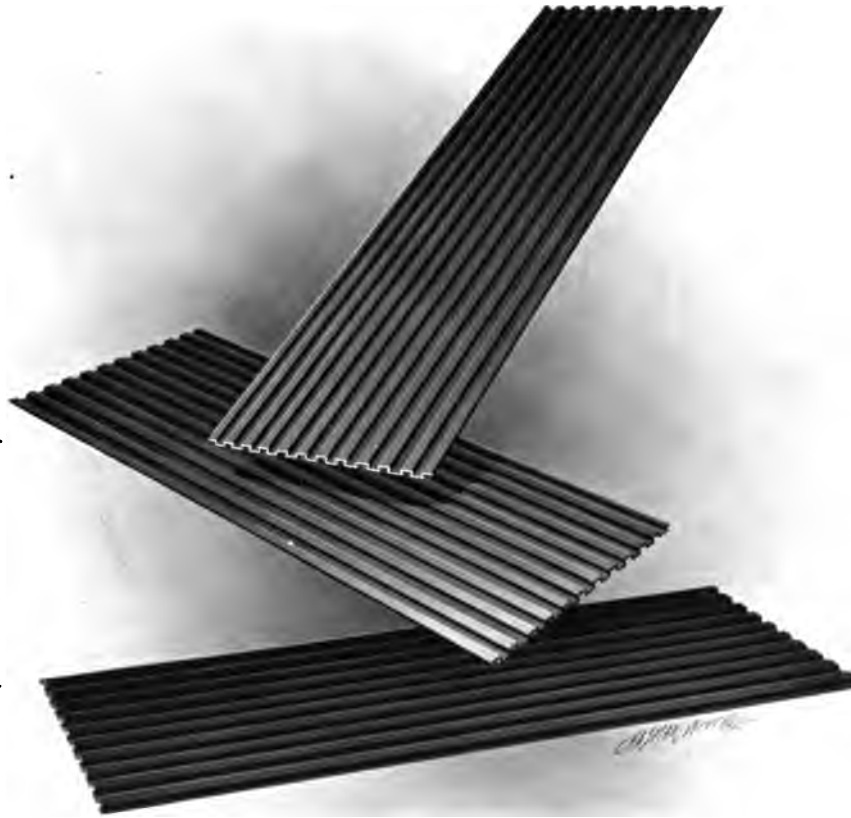
WORKS: CLEVELAND, OHIO.

Manufacturers of  
“Ferroinclave” Sheets  
For the Roofing, Siding, and  
Floors of Fire-proof Buildings.

*Ferroinclave*

TRADE-MARK.

*Ferroinclave* is the name of  
a new steel and cement fire-  
proof construction of simple  
form for the roofing, siding, floor-  
ing, etc., of modern buildings.  
*Ferroinclave* as an article of  
manufacture, as well as the  
method of making same, is  
patented in the United States  
and foreign countries and is the



invention of Mr. Alexander E.  
Brown, Vice-President of The  
Brown Hoisting Machinery  
Company.

We issue a special catalog  
of thirty-two pages describing  
*Ferroinclave*, which we will  
be pleased to send to any one  
writing for same.

Address all communications  
to our *Ferroinclave* Depart-  
ment.

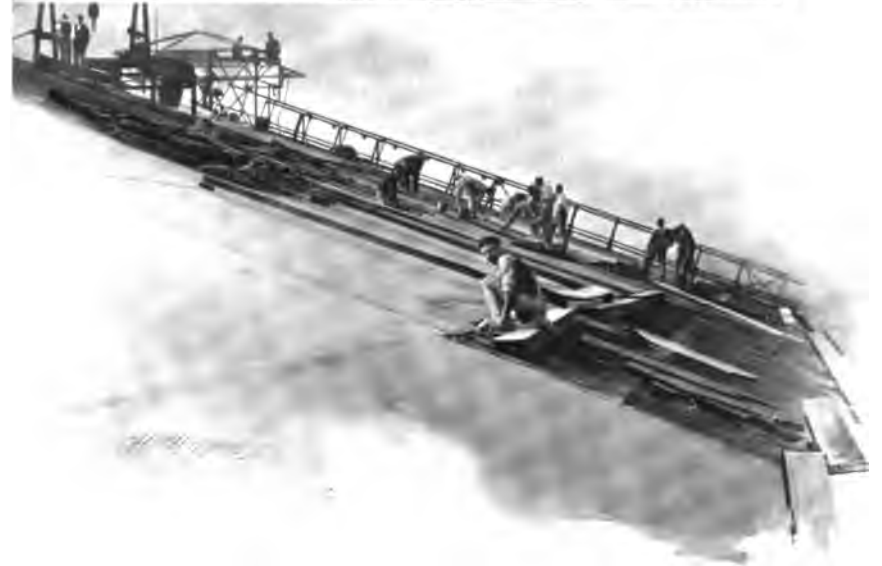
The Brown Hoisting  
Machinery Company

CLEVELAND, OHIO,

or to our nearest office.

# THE BROWN HOISTING MACHINERY COMPANY.

Manufacturers of "Ferroinclave."



PUTTING ON AND CEMENTING A "FERROINCLAVE" ROOF.  
WORKS: CLEVELAND, OHIO.

# THE BROWN HOISTING MACHINERY COMPANY.

## "BROWNHOIST" LOCOMOTIVE-COALING CRANES.

A simple, new, and efficient method of coaling locomotives and removing their ashes.



**"BROWNHOIST" LOCOMOTIVE-COALING CRANE.**

At Wilson Avenue Station, Erie Railroad, Cleveland, Ohio, showing ash-pit and track arrangement.

"Coal after being taken from car is deposited in locomotive-tender."

This equipment has been designed to meet the constant demand for a small locomotive coal- and ash-handling plant of high efficiency and low first cost.

The "BROWNHOIST" Locomotive-coaling Crane shown above meets these conditions admirably, and those roads now using this equipment say it is the best device yet introduced for the rapid and economical coaling of locomotives.

We shall be pleased to furnish detailed specifications of these cranes and equipment upon receipt of request.



# THE BROWN HOISTING MACHINERY COMPANY.

WORKS: CLEVELAND, OHIO.

Engineers and Manufacturers of The Brown Patent Movable-tramway Sewer-machine.



**SEWER-MACHINE.**

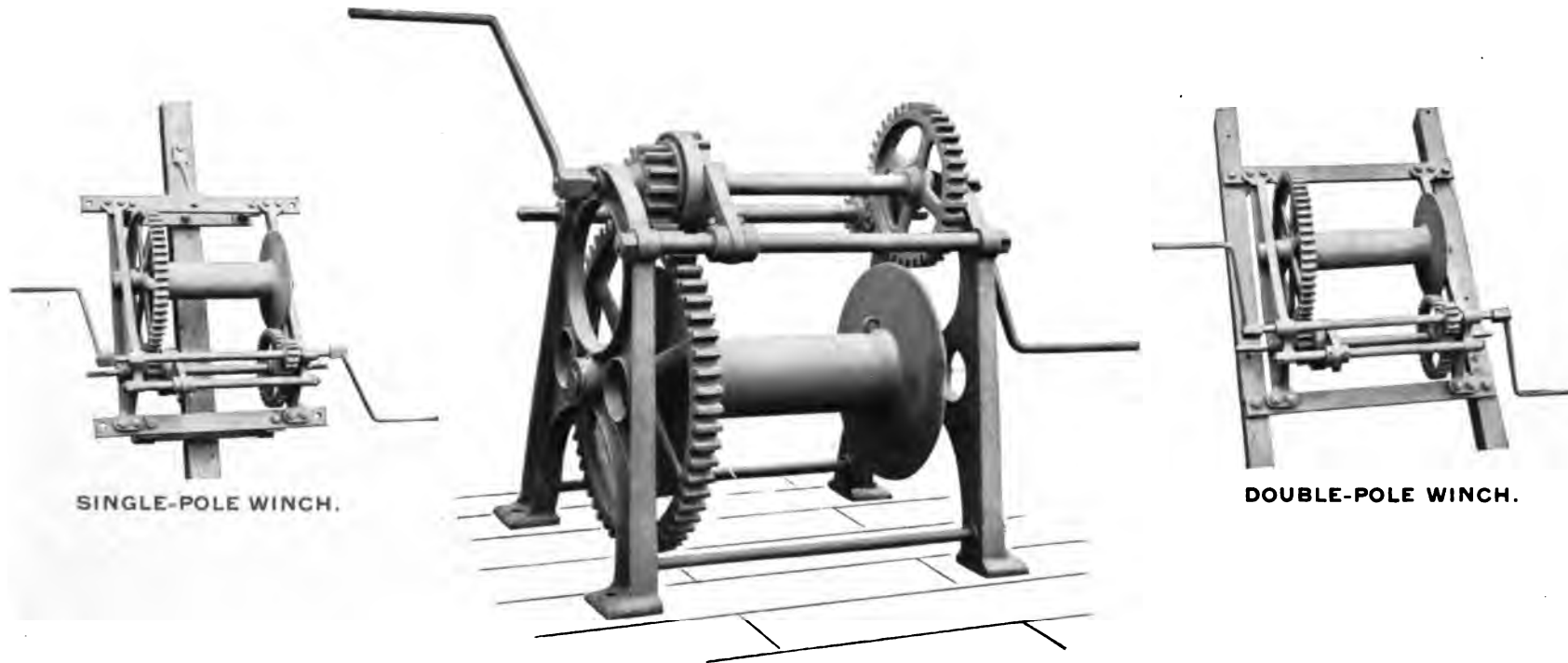
The Brown Patent Movable-tramway Sewer-machine is designed for the rapid handling of material in the excavation of sewers and trenches, such as conveying the earth from the trench, handling the material, brick, cement, etc., in the construction of sewers, handling large pipe, the laying of water-mains, and replacing the excavated material on the finished work. It consists of a series of A frames, from the apices of which are suspended a continuous track-beam and rail, on which travel one or more carriers, or trolleys, to which are attached the buckets containing the material to be moved. Write for further particulars and prices to our nearest office.

# THE BROWN HOISTING MACHINERY COMPANY.

Manufacturers of "Brownhoist" Standard Crabs and Winches.

WESTON'S PATENT.

These are *strictly safety* crabs and winches. The load can not drop. The handles can not fly back.



SINGLE-POLE WINCH.

DOUBLE-POLE WINCH.

STANDARD CRAB.

Write for our Special Crab and Winch Circular.

MAIN OFFICE AND WORKS: CLEVELAND, OHIO.

BRANCH OFFICES: NEW YORK, PITTSBURG, LONDON.

# THE BROWN HOISTING MACHINERY COMPANY.

Manufacturers of

Brown's Patent Steel-plate  
Trolleys and Complete Over-  
head Tramrail Equipment.

BROWNHOIST TROLLEYS.

Brown's Patent Steel-plate Trolley  
has the frame constructed of steel plates  
with inner bearing-plates securely bolted  
to outside plates. The wheels are secured

on steel pins which turn in adjustable bearings, giving an inside as well as  
an outside support to the wheels, thereby reducing very materially the  
resistance to movement along the tramrail. These bearings are self-  
oiling and are equipped with proper receptacles for holding several  
weeks' supply.

In these trolleys the wheels are of maximum diameter, which is  
almost as much as the depth of the I-beam. The large wheels, the  
size of which largely determines the traveling resistance, can best be  
used with our special form of hanger-bolts. We can furnish these  
trolleys with smaller diameter wheels when necessary, and can furnish  
the heavier sizes with hand-power moving-gear.

Send for our 24-page special Tramrail and Trolley Circular and Price-list.

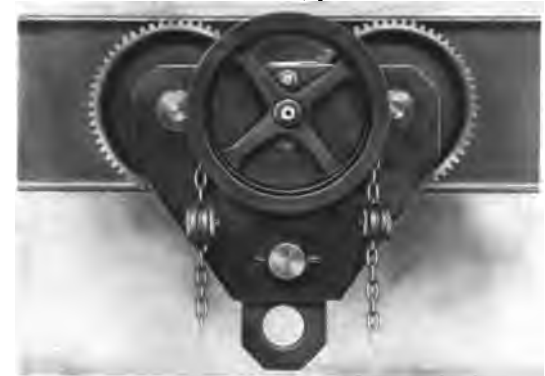
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**STEEL-PLATE TROLLEY.**



**STEEL-PLATE TROLLEY.**  
With Clevis connection for reduced clear-  
ance. 3 to 10 tons.



**STEEL-PLATE TROLLEY.**  
Hand-power moving-gear.



**STEEL-PLATE TROLLEY.**  
With Clevis connection for reduced clear-  
ance. 1/2 to 2 tons.

# THE BROWN HOISTING MACHINERY COMPANY.

Engineers and Manufacturers,  
Steam and Electric Hoisting-drums for Mining and Other Uses.



ONE OF SIX SPECIAL MINING-HOISTS FOR DE BEERS GOLD CONSOLIDATED MINES, SOUTH AFRICA.



TWO-DRUM AND TWO-MOTOR HOIST FOR OPERATING "BROWNHOIST" BRIDGE-TRAMWAY.

Special Hoists built to order.

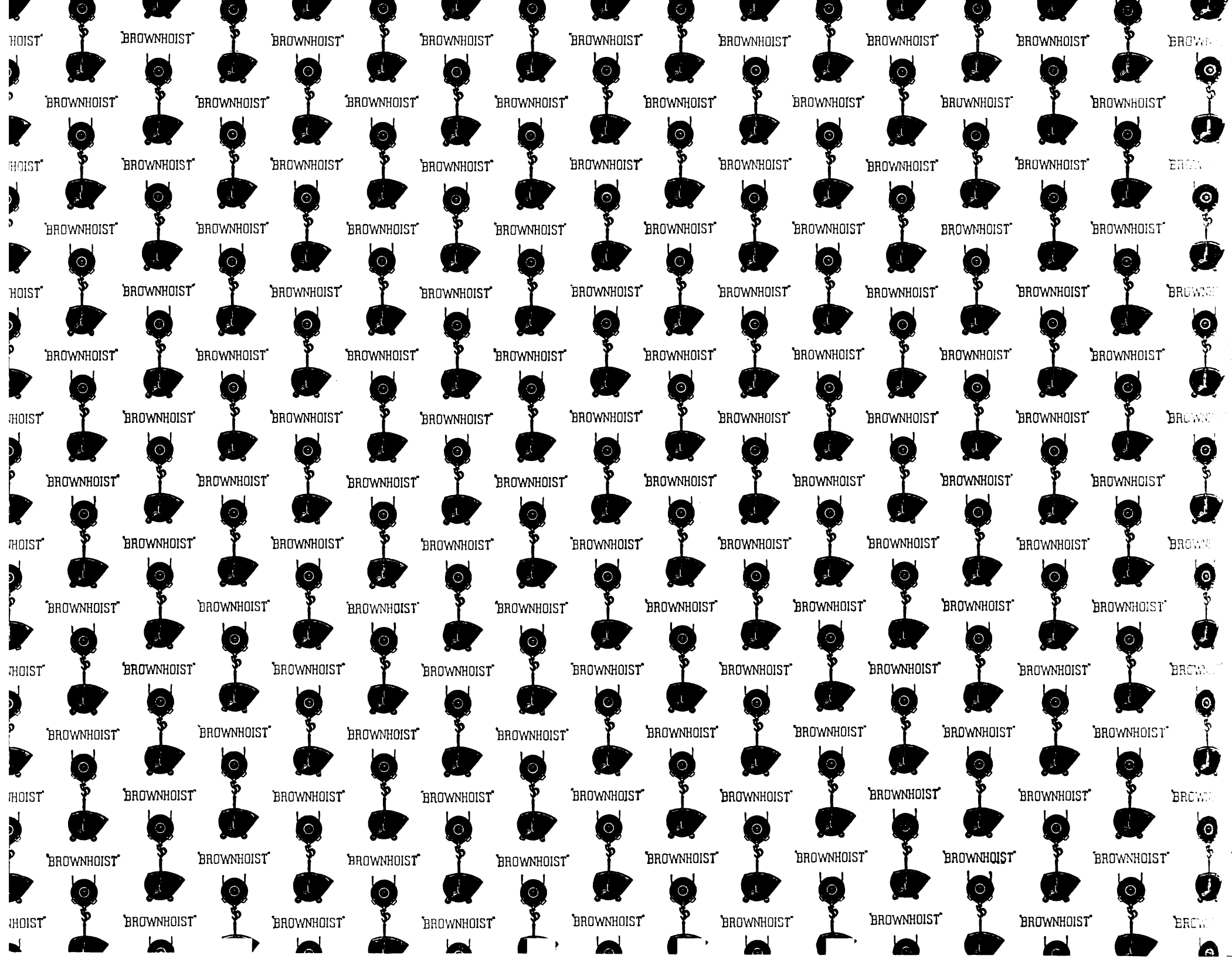
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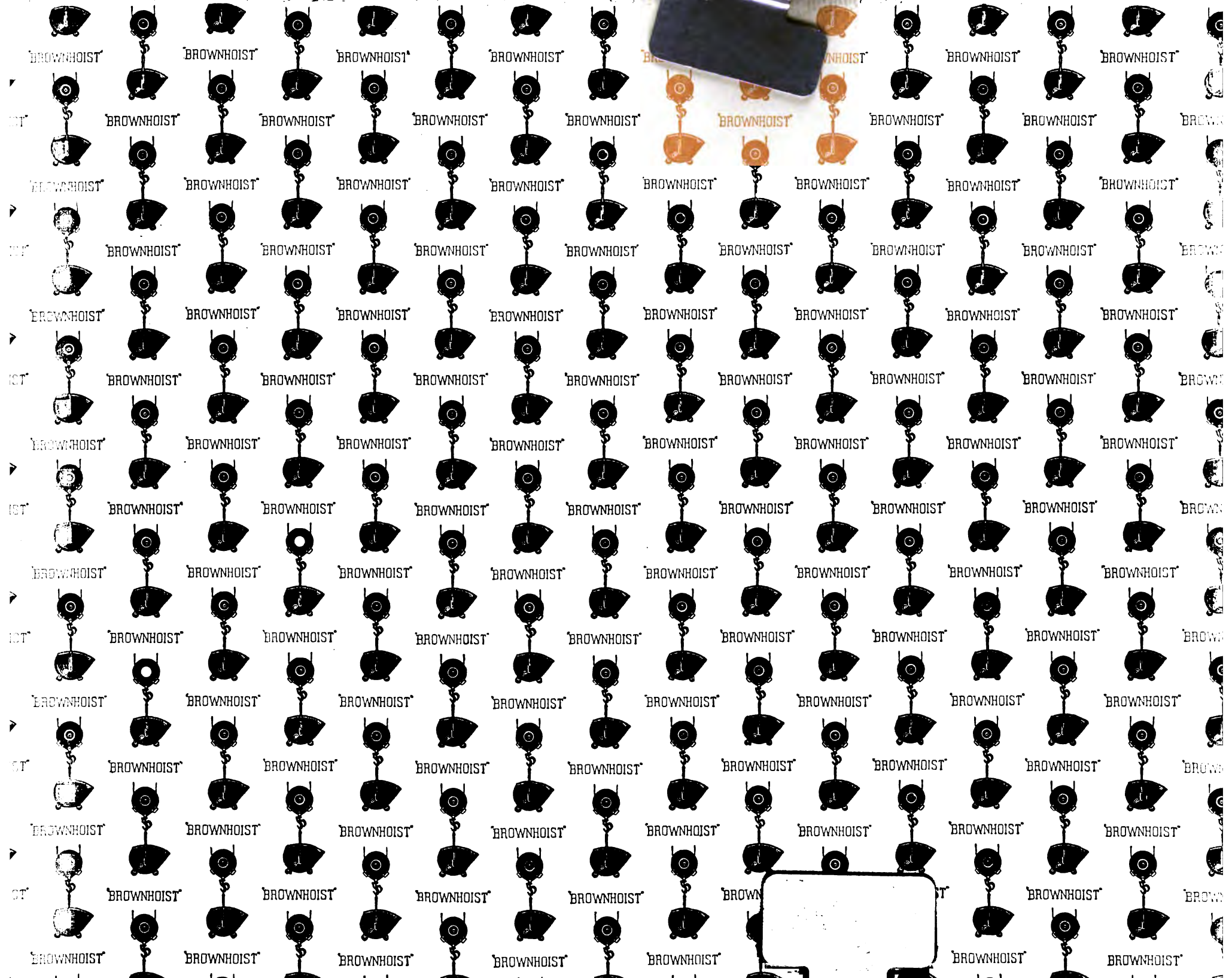












"Brownhoist" :  
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